# PowerStruXure
# User's Manual

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# Safety Information

# Safety Warnings

This manual is intended for use by the following groups:

- Users
- Licensed electricians
- APC Field Service Engineers
- Qualified, APC-trained personnel

This manual indicates who must perform specific procedures. Failure to follow the instructions in this manual could result in damage to property, personal injury, or even death.s

**Safety symbols used in this guide**



Indicates a hazard, which, if not avoided, could result in injury or death.



Indicates a hazard, which, if not avoided, could result in damage to product or other property.



Indicates important information.



Indicates a heavy load that should not be lifted without assistance.

**General safety warnings**



IMPORTANT SAFETY INSTRUCTIONS
Save these instructions. This manual contains important instructions that should be followed during installation and maintenance of the PowerStruXure system.

INSTUCTIONS IMPORTANTES CONCERNANT LA SÉCURITÉ
Conserver ces instructions. Cette notice contient des instructions importantes concernant la sécurité.

**Total Power Off Procedure**:

1. Set the Symmetra 3-Phase UPS System Enable switch to the Standby or Off position.

2. Open the Symmetra 3-Phase UPS DC Disconnect breaker.

3. Open the PDU with System Bypass Main Input breaker.

4. Open the DC Disconnect breaker of each XR Battery Cabinet.

5. Disconnect the batteries in the Symmetra 3-Phase UPS by pulling them out approximately one inch (25.4 mm) from their normal position.

Hazardous, live parts inside the Symmetra 3-Phase UPS are energized from the battery supply even when the AC power is disconnected.

Hazardous, live parts may exist inside the PDU with System Bypass due to the Symmetra 3-Phase UPS inverter even when the AC power is disconnected. Test before touching any electrical parts.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his or her own expense.

**PDU with System Bypass**

Hazardous, live parts inside the PDU with System Bypass are energized from the battery supply of the attached Symmetra 3-Phase UPS even when the AC power is disconnected.

Risk of Electrical Shock. No user serviceable parts inside. Refer all servicing to an APC Field Service Engineer.

A licensed electrician must perform the following:

- Connection to the branch circuit.
- Connection of PDU power cords in addition to the factory-installed power cords.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The Branch Circuit conductors are secured to the Main Input Circuit Breaker. Ensure that the circuit breaker terminals are tightened to the torque specified on the circuit breaker's label.

This product is intended for installation in a temperature-controlled ($0^o$ C–$40^o$ C), indoor area, free of conductive contaminants.

## Symmetra 3-Phase UPS

The Symmetra 3-Phase UPS contains an internal energy source. Hazardous voltage can be present even when disconnected from the utility power source.

All power wiring from the Symmetra 3-Phase UPS to the PDU with System Bypass must be completed by an APC Field Service Engineer.

A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

- Remove all conductive jewelry such as chains, watches, and rings.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of the batteries.

When replacing batteries, replace with same number and type as installed. For customer-supplied external batteries, see manufacturer's installation and safety instructions.

## Other components

*Automatic Transfer Switch, Metered Rack-Mount PDU, Information Controller, and Information Controller Hub.*

This equipment contains potentially hazardous voltages. Do not attempt to disassemble the unit.

This equipment contains no user serviceable parts. Repairs are performed only by factory-trained service personnel.

# Overview

# PDU with System Bypass

**Front veiw**



| | | | |
|---|---|---|---|
| ❶ | Power cable (whip) | ❹ | Cable access holes |
| ❷ | Display interface | ❺ | Power cable trough |
| ❸ | L21-20 outlet | ❻ | Data cable trough |

**Front view (interior)**
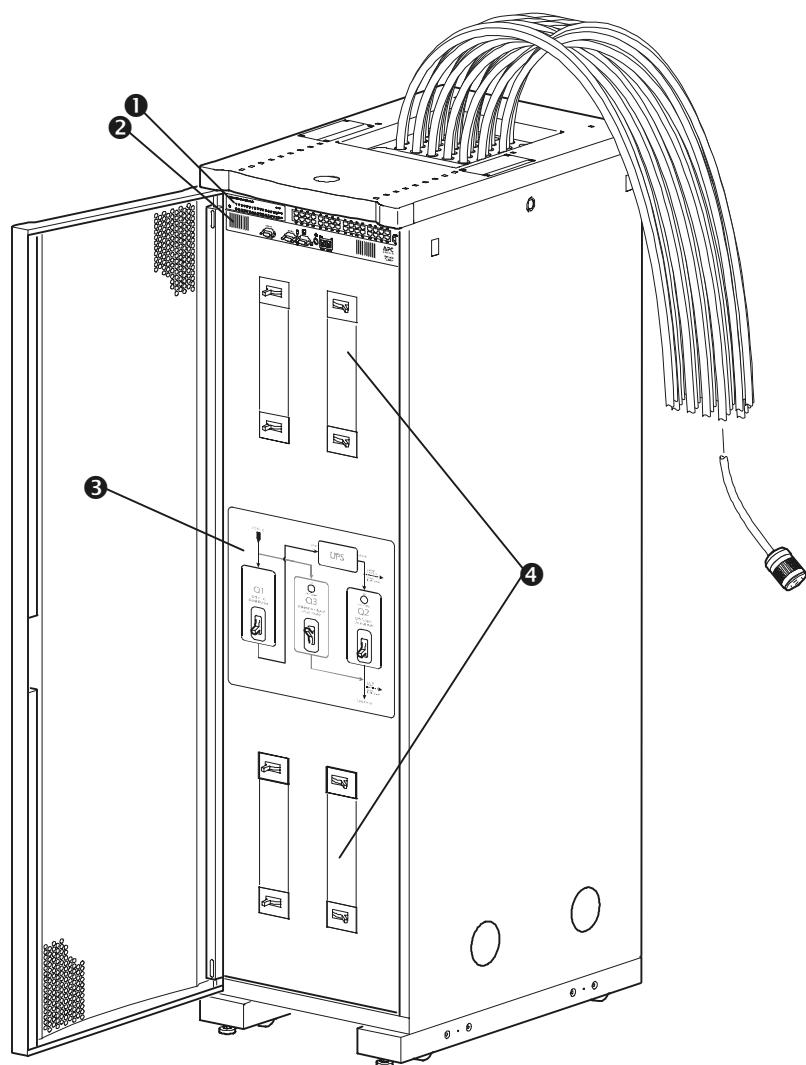
| ❶ | Information Controller Hub | ❸ | Wraparound maintenence bypass panel |
| ❷ | Information Controller | ❹ | 42-position circuit breaker panels |

**Rear view (interior)**
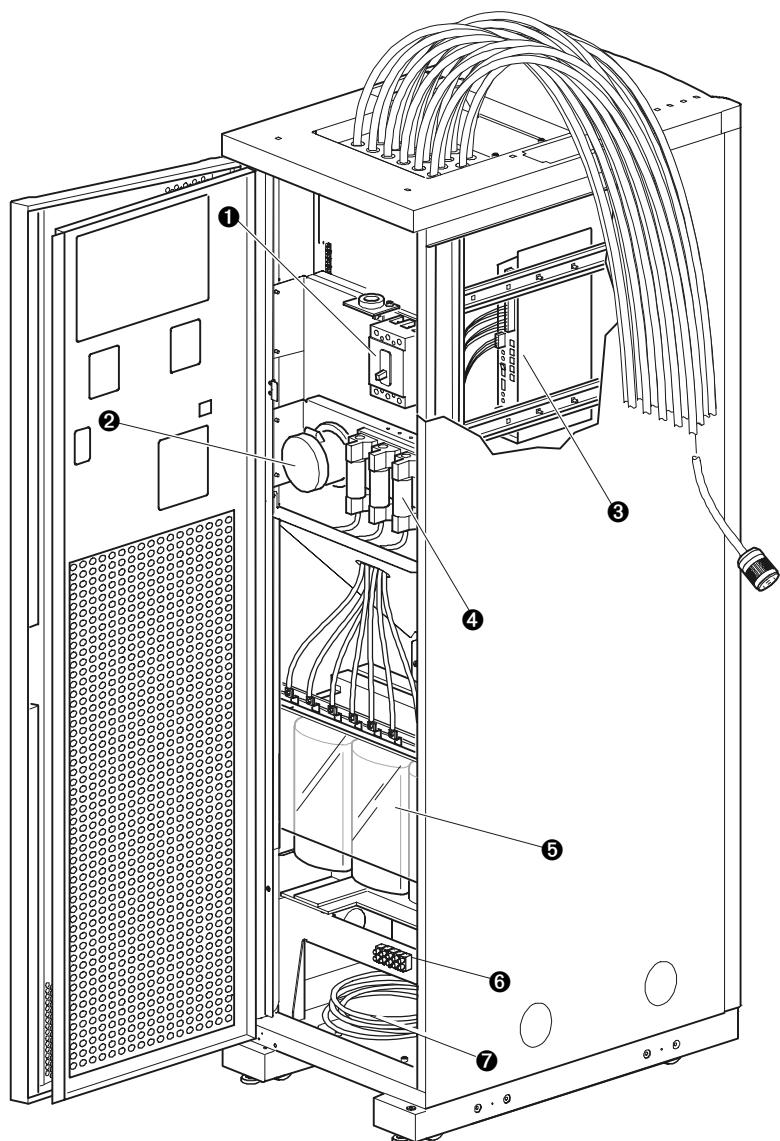


❶ Main input circuit breaker    ❺ PDU transformer

❷ Load test bank connector    ❻ EPO switch interface

❸ PDU monitoring unit    ❼ UPS input and output connector cables

❹ Fuses for external static switch

# Symmetra 3-Phase UPS
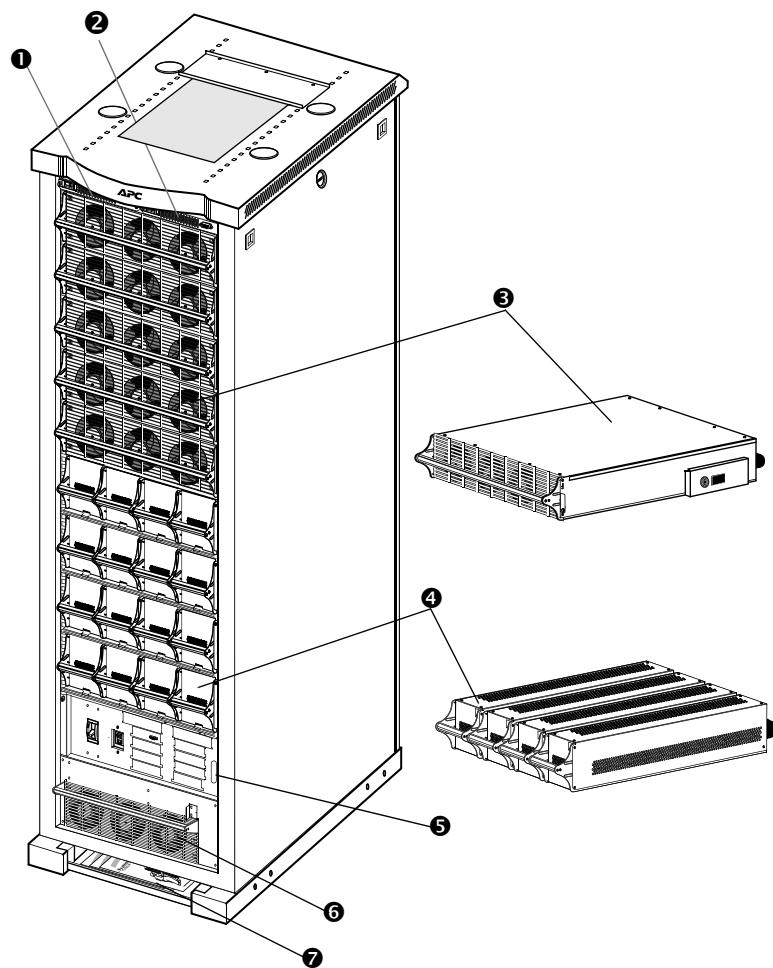


| | | | |
|---|---|---|---|
| ❶ | Main intellegence module (MIM) | ❺ | Access for data cables |
| ❷ | Redundant intelligence module (RIM) | ❻ | Static switch module |
| ❸ | Power module | ❼ | Documentation tray |
| ❹ | Battery module (four battery units) | | |

| ❶ | DC disconnect breaker | ❻ | External switch gear monitoring card |
| ❷ | System-enable switch | ❼ | Display/computer interface card |
| ❸ | System power supply cards | ❽ | Battery monitoring card |
| ❹ | Available card slots | ❾ | Reserved for future use |
| ❺ | Network Management Card | ❿ | Extended-Run Frame card |
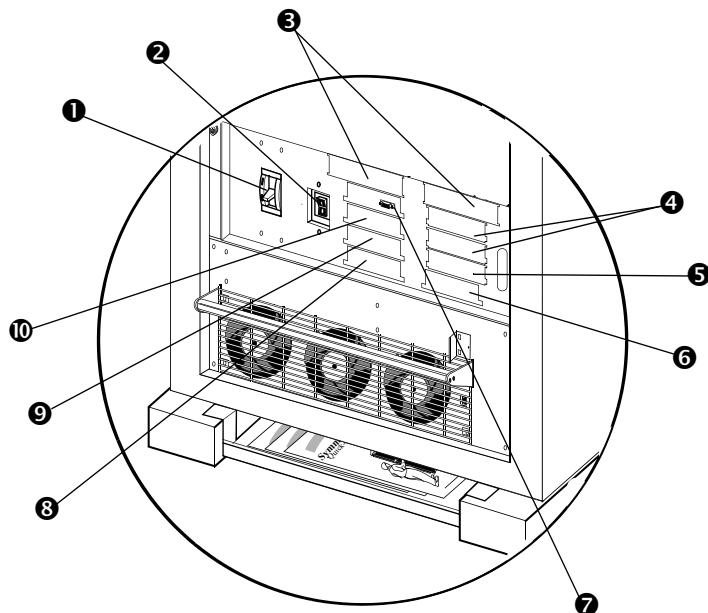
# NetShelter VX Enclosures

The APC Netshelter® VX enclosure allows 42U (73.50 in) of storage height for EIA-310, 19-inch, rack-mount equipment. It comes in two models:

- AR2100BLK—the base enclosure
- AR2101BLK—an expansion enclosure
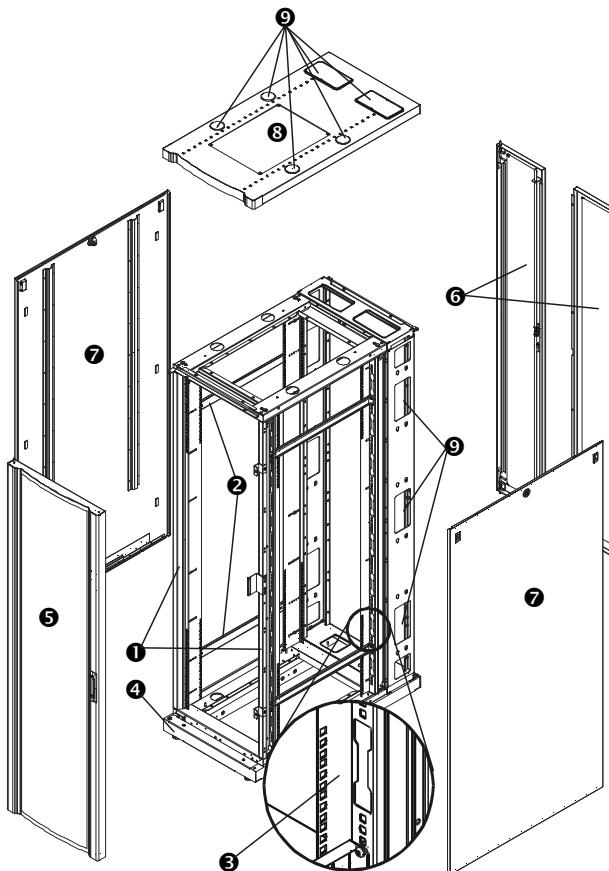


| | | | |
|---|---|---|---|
| ❶ | Frame posts | ❻ | Ventilated split rear door for added access in narrow aisles |
| ❷ | Adjustable horizontal braces | ❼ | Quick-release side panels with locks (base model only) |
| ❸ | Vertical mounting rails | ❽ | Ventilated roof |
| ❹ | Skirt | ❾ | Access on roof, sides, and base |
| ❺ | Quick-release, ventilated, reversible front door | | |

**Cable-routing equipment**
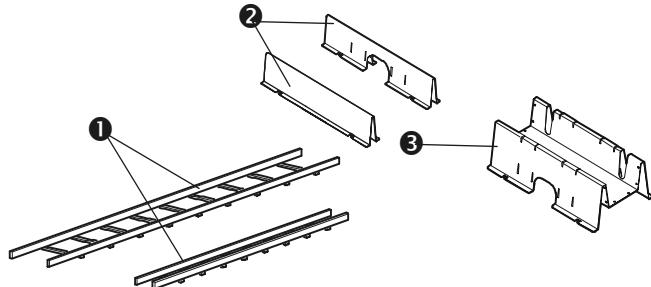


❶ Overhead ladders    ❸ Power cable trough

❷ Data partitions

**NetShelter VX options**

Options for this enclosure include the following:

- Stabilizer plate
- Bolt-down brackets
- Cable management devices
- Toolless mounting for some accessories

*Expansion and mounting hardware*

| Item | Quantity | |
|---|---|---|
| | **AR2100BLK** | **AR2101BLK** |
| **Expansion hardware** | | |
| Baying brackets | – | 4 |
| Vertical baying trim | – | 1 |
| M6 x 12 socket-head screws | – | 8 |
| M6 caged nuts | – | 8 |
| **Mounting hardware** | | |
| M6 × 16 mm Phillips/slotted screws | 60 | 60 |
| Caged nut installation tool | 1 | 1 |
| M6 caged nuts | 60 | 60 |
| Plastic cup washers | 60 | 60 |
| Open-ended wrench (13/14 mm) | 1 | 1 |
| M5 Allen wrench | 1 | 1 |
| Door/side panel keys | 2 | 2 |

# 3-Phase Automatic Transfer Switch

**AP7701**
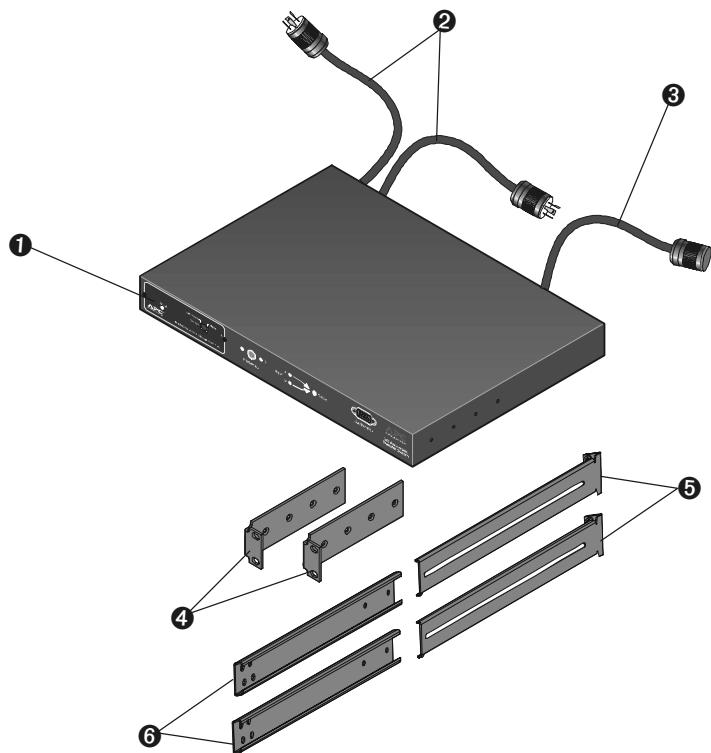
❶     Network Management Card (AP9617)

❷     Two NEMA L21-20 plugs (cords: 36 inches)

❸     NEMA L21-20R receptacle (cord: 36 inches)

❹     Rack-mount brackets

❺     Rear rail segments

❻     Front rail segments

# Metered Rack-Mount PDU
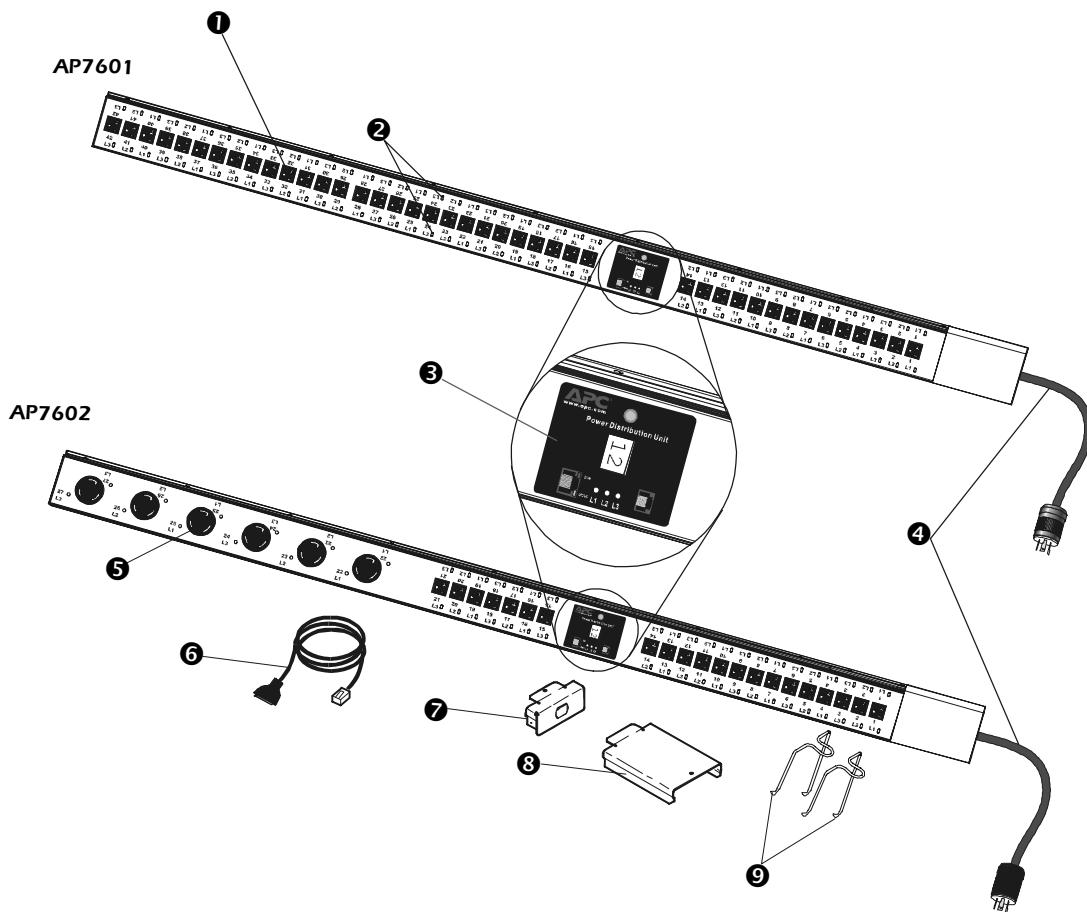


**AP7601**

**AP7602**

| ❶ | NEMA 5-20R outlets | ❻ | Serial cable (940-0144) |
|---|---|---|---|
| ❷ | Cord retension clip holes | ❼ | Hardwire end cap (870-70803) |
| ❸ | Digital display | ❽ | Hardwire access cover (870-70804) |
| ❹ | L21-20 power cord | ❾ | Cord retention clip—AP7601:42; AP7602:21 (870-70945) |
| ❺ | NEMA L6-20R outlets | | |

# Information Controller and Hub

**Information Controller
Hub**
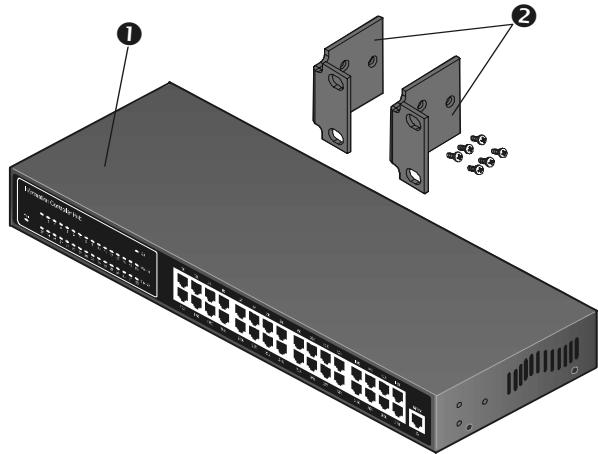


❶ Information Controller Hub (32-port hub)

❷ Rack-mount brackets (2) and screws (6)

**Information Controller**
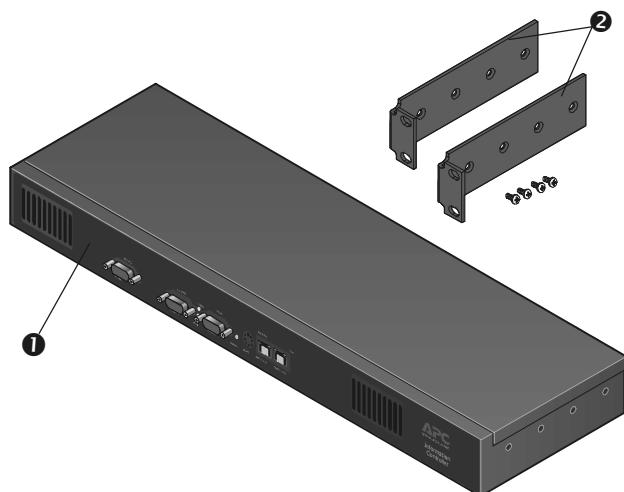


❶ Information Controller

❷ Rack-mount brackets (2) and screws (4)

**Note** The Information Controller and the Information Controller Hub connect to powercords pre-installed in the PDU. These cords are a 5-15 to IEC C13 and an IEC C13 to an IEC C14.

# Site Planning

# PDU with System Bypass

**Weight/Dimensions**
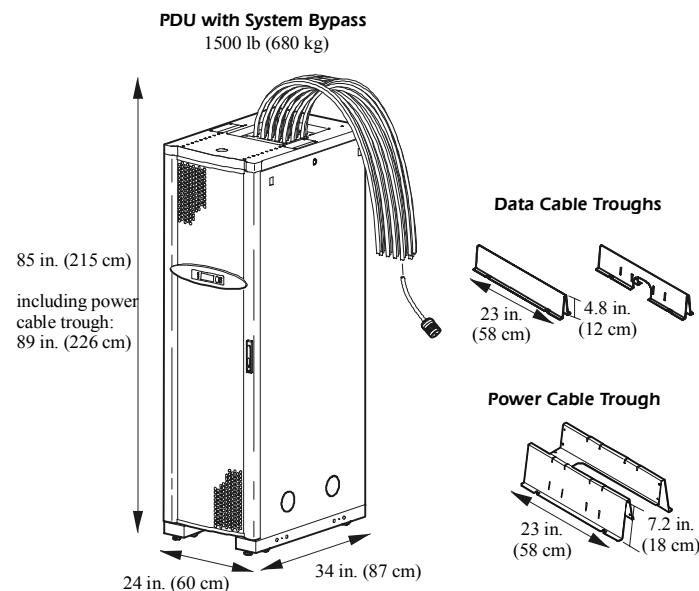
**PDU with System Bypass**
1500 lb (680 kg)

85 in. (215 cm)

including power cable trough:
89 in. (226 cm)

24 in. (60 cm)

34 in. (87 cm)

**Data Cable Troughs**

23 in. (58 cm)

4.8 in. (12 cm)

**Power Cable Trough**

23 in. (58 cm)

7.2 in. (18 cm)

**Space considerations**

Study the figure below to determine your space requirements for installing the PDU with System Bypass. The clearances listed below are required to comply with Table 110-26 of the 1999 National Electric Code. In accordance with section 110-26 of this code, the 36-inch depth is required for all 120/208V products and the majority of 277/480V and 346/600V products. If 277/480V and 346/600V products are installed adjacent to an uninsulated concrete wall, you must have a working depth space of 42 inches. Consult your local code for additional requirements.

**Floor-to-Ceiling Ventilation**
>101 in. (236 cm)

**Minimum Rear Clearance**

**Minimum Front Clearance**

PDU

36 in. (91 cm)

34 in. (86 cm)

24 in. (60 mm)

36 in. (91 cm)

**Weight considerations**

Ensure that the floor and sub-floor can support the total weight of the configuration when concentrated on the leveling feet. If you are placing equipment on a raised floor, consult the flooring manufacturer for loading requirements prior to installing equipment.

**PDU with System Bypass Weight: 1500 lb (680 kg)**

See "Weight considerations" on page 25 and on page 27 for weight measurements for the Symmetra 3-Phase UPS and NetShelter VX enclosures.

**BTU Considerations**

Consider the BTU ratings of equipment to determine cooling requirements. Additional cooling equipment may be required. Refer to the table below for BTU output of the PDU with System Bypass.

| Product Voltage | BTU Output |
|---|---|
| 208 V | 4645 |
| 480 V | 4617 |
| 600 V | 3425 |

BTU was calculated with the following formula:

```
[(Load x % 2 x Mfg. specified load loss) + Mfg.
specified core loss] x 3.414
```

This calculation is based on the following Square D transformers:

- 208 V: 60T211HCUOCSW3
- 480 V: 60T3HCUOCSW3
- 600 V: 60T65HCUOCSW3

**(!) Note** The BTU output is higher while batteries are charging. Under normal operating conditions, battery recharge periods are relatively infrequent.

**Operating conditions**

| PDU with System Bypass | |
|---|---|
| Operating environment | Protected from water and conductive contaminates |
| Temperature class (transformer) | Class H 220° C |
| Storage elevation (for shipping by air) | 33,000 ft (10 000 m) |
| Relative humidity (for operating and storage) | 95% non-condensing |
| Operating temperature | 32–104° F (0–40° C) |
| Acoustic noise emission | Maximum 50 dB(A) at 1 m |

### Electrical requirements


**Electrical Hazard**

All power wiring, including connection to the branch circuit, must be installed by a qualified electrician and must comply with local and country codes.

|  | **208 V** | **480 V** | **600 V** |
|---|---|---|---|
| Service distribution breaker (provided by customer) | 200 A | 100 A | 80 A |
| Conductors to main input breaker (provided by customer) | 3/0 conductors | #3 conductors | #4 conductors |

### Electrical specifications

|  | **208 V** | **480 V** | **600 V** |
|---|---|---|---|
| Transformer type | Isolation | Step-down | Step-down |
| Transformer configuration | Delta to WYE | Delta to WYE | Delta to WYE |
| Voltage requirements, nominal | 208/120 V | 208/120V | 208/120V |
| Frequency | 57–63 Hz | 57–63 Hz | 57–63 Hz |
| Input voltage AC | 3-phase 3-wire plus ground, 208V | 3-phase 3-wire plus ground, 480V | 3-phase 3-wire plus ground, 600V |
| Output voltage AC | 3-phase 4-wire plus ground, 120/208V | 3-phase 4-wire plus ground, 120/208V | 3-phase 4-wire plus ground, 120/208V |
| Output rating (full load) | 40 kW | 40 kW | 40 kW |
| Maximum continuous input current (at minimum mains) | 155 A | 67 A | 54 A |
| Maximum continuous output current + 125% overload (Bypass mode only) | 139 A | 139 A | 139 A |
| Output current, nominal | 111 A | 111 A | 111 A |
| Input current, nominal | 125 A | 54 A | 43 A |
| Internal static switch fuses | 175 A | 175 A | 175 A |
| External output breaker | 150 A | 150 A | 150 A |

# Symmetra 3-Phase UPS

## Weight/Dimensions
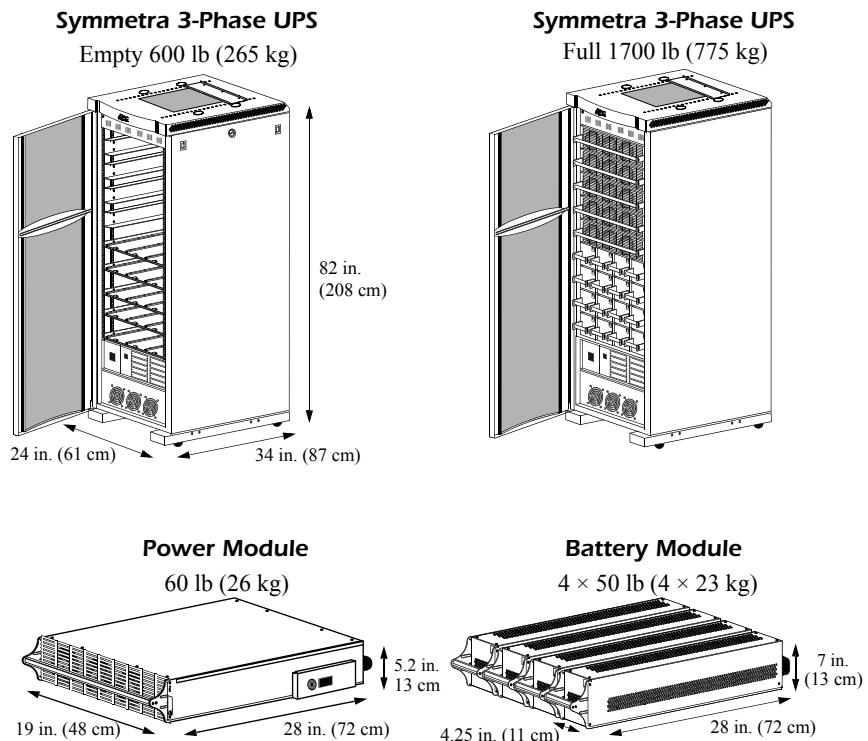
**Symmetra 3-Phase UPS**
Empty 600 lb (265 kg)

**Symmetra 3-Phase UPS**
Full 1700 lb (775 kg)

82 in.
(208 cm)

24 in. (61 cm)     34 in. (87 cm)

**Power Module**
60 lb (26 kg)

**Battery Module**
4 × 50 lb (4 × 23 kg)

5.2 in.
13 cm

19 in. (48 cm)     28 in. (72 cm)

7 in.
(13 cm)

4.25 in. (11 cm)     28 in. (72 cm)

## Space considerations

Study the figure below to determine your space requirements for installing the Symmetra 3-Phase UPS. The clearances listed below are required to comply with Table 110-26 of the 1999 National Electric Code. In accordance with section 110-26 of this code, the 36-inch depth is required for all 120/208V products and the majority of 277/480V and 346/600V products. If 277/480V and 346/600V products are installed adjacent to an uninsulated concrete wall, you must have a working depth space of 42 inches. Consult your local code for additional requirements.

**Floor-to-Ceiling Ventilation**
> 91 in. (230 cm)

**Minimum Rear Clearance**

**Symmetra 3-Phase UPS**

36 in.
(91 cm)

**Minimum Front Clearance**

34.3 in.
(87 cm)

23.5 in.
(60 cm)

36 in.
(91 cm)

**Weight considerations**

Ensure that the floor and sub-floor can support the total weight of the configuration when concentrated on the leveling feet. If you are placing equipment on a raised floor, consult the flooring manufacturer for loading requirements prior to installing equipment.

**Symmetra 3-Phase UPS Weight**:**1700 lb (775 kg)**

See "Weight considerations" on page 21 and on page 27 for weight measurements for the Power Distribution Unit and NetShelter VX enclosures.

**BTU Considerations**

Consider the BTU ratings of equipment to determine cooling requirements. Additional cooling equipment may be required. BTU output of the Symmetra 3-Phase UPS is: 12,682 BTU/hr (North America)

> **Note** The BTU output is higher while batteries are charging. Under normal operating conditions, battery recharge periods are relatively infrequent.

**Operating conditions**

| Symmetra 3-Phase UPS | |
|---|---|
| Temperature range | 32–104°F (0–40°C) |
| Relative humidity | < 95% |
| Maximum elevation | 0–10,000 ft (0–3048 m) |
| Nominal full load | 12,682 BTU/h |
| Full load loss at nominal mains | 3716 W |
| Operating environment | Keep ventilated; keep dust and corrosive fumes away from the Symmetra 3-Phase UPS. |

**Electrical Requirements**

> **Electrical Hazard** Power wiring must be installed by an APC Field Service Engineer.

| | |
|---|---|
| Input voltage AC, nominal | 3-phase 208 V |
| Output voltage AC, nominal | 3-phase 208 V |
| Full load output rating (in maximum configuration) | 40 kW |
| Input frequency | 60 Hz |
| Output frequency | Synchronized to mains in normal operation; 60 Hz in battery operation. |
| Maximum input current | 140 A |
| Maximum output current (125% load—Bypass mode only) | 139 A |
| Output current per phase, nominal | 111 A |
| Output per neutral, nominal (APC recommends the neutral to be 2 × phase.) | 192 A |
| Input current, nominal | 123 A |
| Input current limit | 162 A |

# Emergency Power-Off Switch

**Overview of EPO**

A remote switch (not included) is attached at the EPO interface in the PDU with System Bypass. The EPO interface ❶ is connected to the PDU with System Bypass Main breaker ❷ and to the Symmetra 3-Phase UPS internal EPO switch ❸ (connection to the Symmetra 3-Phase UPS is made during installation of PowerStruXure). When the remote EPO Switch is enabled, power will be terminated at the PDU with System Bypass and the Symmetra 3-Phase UPS, providing a single point for emergency shutdown of the PowerStruXure system.
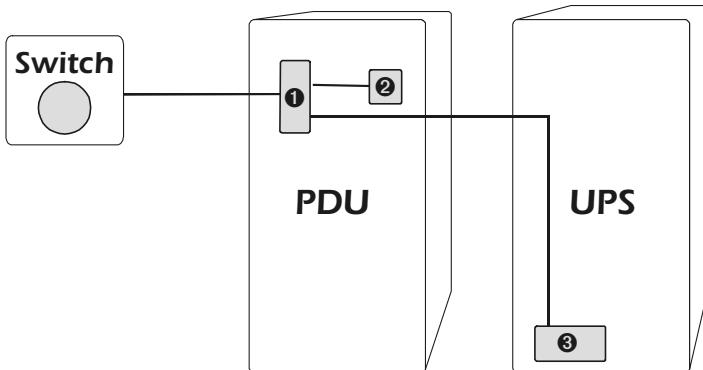
# NetShelter VX Enclosures

**Weight/Dimensions**

The American Power Conversion (APC) NetShelter® VX is a high-quality enclosure for storage of industry-standard (EIA-310) 19-inch equipment, which includes servers, voice, data, networking, internetworking, and APC power protection equipment. Both the base enclosure (AR2100BLK) and the expansion enclosure (AR2101BLK) provide 42U of mounting space.
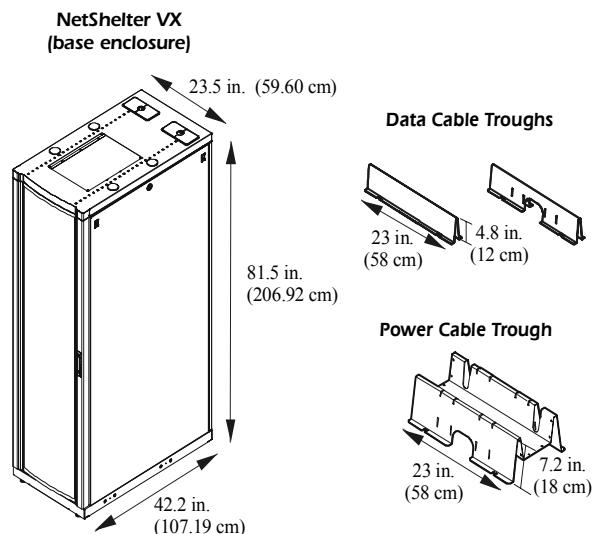


**NetShelter VX (base enclosure)**

**Space considerations**

Study the figure below to determine your space requirements for installing NetShelter VX enclosures.
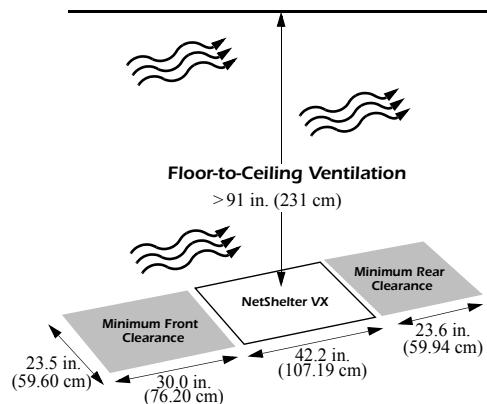


**Weight considerations**

Ensure that the floor and sub-floor can support the total weight of your system configuration when concentrated on the leveling feet. If you are placing equipment on a raised floor, consult the flooring manufacturer for loading requirements prior to installing equipment.

**Enclosure weight (empty): 359 lb (162.8 kg)**

The rack is rated at 2000 lb for a static load, and 1400 lb for a dynamic load. See "Weight considerations" on page 21 and on page 25 for weight measurements for the PDU with System Bypass and the Symmetra 3-Phase UPS.

# Installation

# PDU with System Bypass

***Tools required***

The following table lists all tools required for installation if your configuration places the PDU with System Bypass adjacent to the Symmetra 3-Phase UPS. For an installation in which the PDU with System Bypass is not adjacent to the Symmetra 3-Phase UPS, you will also need a selection of tools that are part of a standard electrician's tool set.

| Tool Required | Supplied? |
|---|---|
| Standard screwdriver | No |
| Phillips screwdrivers (various sizes) | No |
| Metric socket wrench (13 mm) or adjustable open-ended wrench, for connecting input and output wires between the PDU with System Bypass and the UPS | No |
| Hex driver (3/16 in.) | No |
| Level | No |
| Open-ended wrench (14 mm) for adjusting the leveling feet of the PDU with System Bypass | Yes |
| 17 mm socket wrench | No |

**Exchange side panels**    Before installing the PDU with System Bypass and the Symmetra
3-Phase UPS, you will need to exchange side panels so that the adjacent
panels will have matching holes for joining the enclosures together and
for routing input and output wiring between them. Perform these steps
before moving the enclosures to adjacent positions.

1.  Remove the side panel from the side of the
    Symmetra 3-Phase UPS that will be adjacent
    to the PDU with System Bypass in your
    planned configuration. (For instructions on
    removing side panels, see "How to remove
    and install the side panels" on page 131.)

2.  Remove the side panel from the side of the
    PDU with System Bypass that will **not** be
    adjacent to the Symmetra 3-Phase UPS.
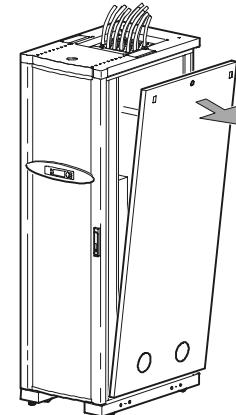
3.  Install on the Symmetra 3-Phase UPS the side panel (with the pre-
    punched hole) that you removed from the PDU with System Bypass
    in Step 2.

4.  Install, on the PDU with System Bypass, the solid side panel that
    you removed from the Symmetra 3-Phase UPS in Step 1.
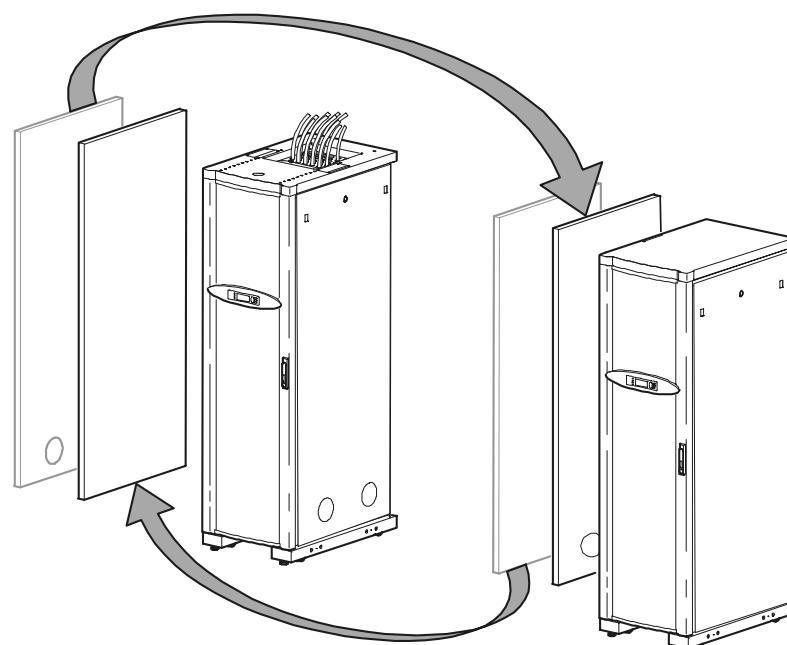
**Join the Symmetra 3-Phase UPS enclosure to the PDU with System Bypass enclosure**

1. Move the Symmetra 3-Phase UPS into position next to the PDU with System Bypass, aligning the two openings in the lower part of the adjacent side panels.

2. Level both the PDU with System Bypass and the Symmetra 3-Phase UPS. For instructions, see "How to level an enclosure" on page 44.

3. Thread the chase nipple (p/n 820-0071), through the opening in the adjacent side panels of the PDU with System Bypass and the Symmetra 3-Phase UPS.
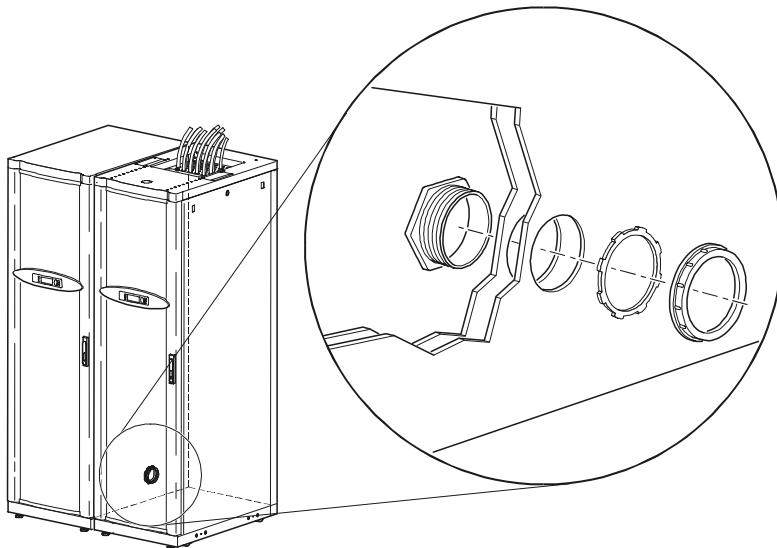


4. Tighten the lock-nut and the bushing on the chase nipple.

**Connection to be performed by a licensed electrician only!**

**A licensed electrician must connect the PDU with System Bypass to the main utility power. Procedures requiring a licensed electrician include:**

⚠️ **Electrical Hazard**

- **connection of main utility conductors**
- **connection to the input circuit breaker of the PDU with System Bypass**
- **connection to a branch circuit**

**Note**

This PDU with System Bypass contains no parts that are serviceable by general users. Refer all servicing to APC Field Service Engineers.

**Connect main utility power**

⚠ **Electrical Hazard** **Ensure that utility power is OFF before beginning installation.**

**A licensed electrician must connect the main utility power**:

1. Run three-wires with an equipment ground wire and a GEC (grounding electrode conductor) from the main utility service of the building to the PDU with System Bypass.

2. Open the back doors of the PDU with System Bypass, using the provided key for the top, smaller door and loosen the two screws holding the larger hinge door in place.
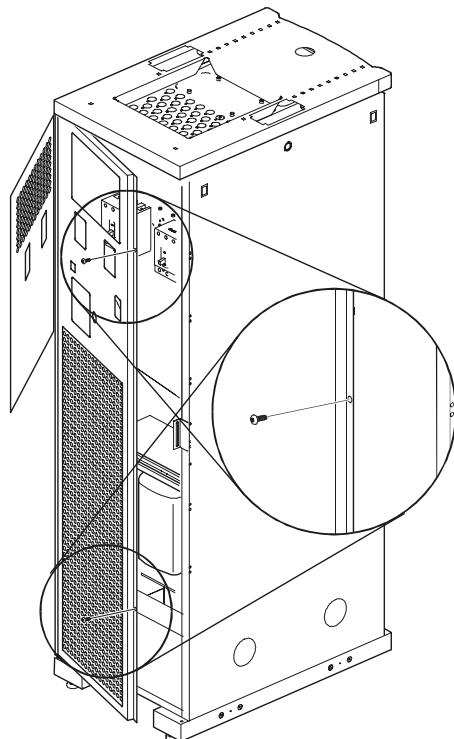


3. Remove the rectangular gland plate by loosening the captive screws, using a Phillips or standard screw driver:

   a. in the bottom of the PDU with System Bypass for wiring under a raised floor.
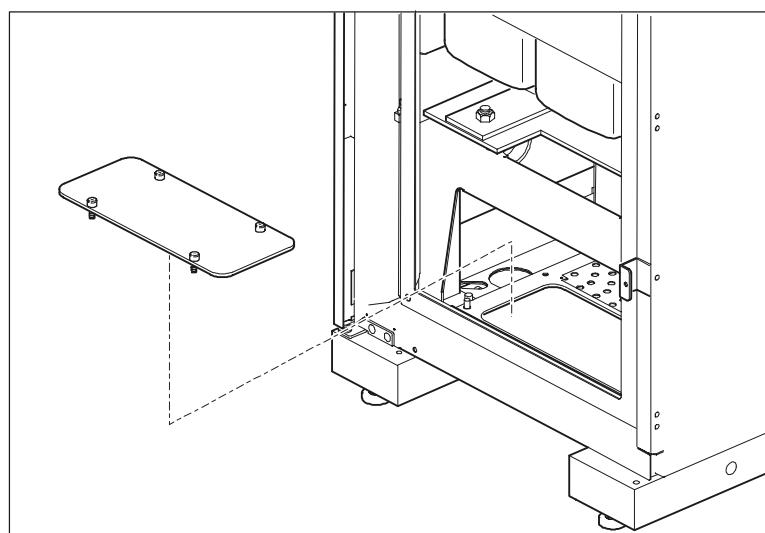
b. or in top of the PDU with System Bypass for overhead wiring.
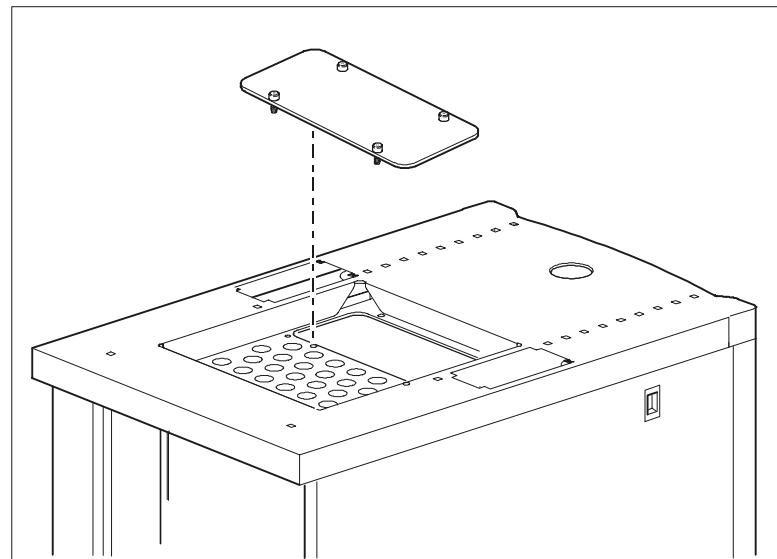


4. Cut an appropriately-sized hole in the gland plate for the conduit.
5. Re-attach the gland plate.
6. Install a lock-nut and bushing to the conduit.
7. Thread the conduit through the hole.
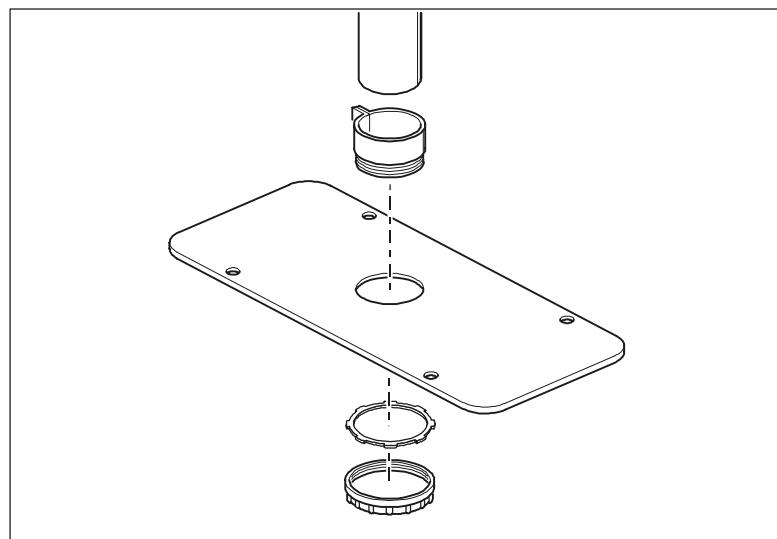
8.  Route the input conductors to the main input circuit breaker of the PDU with System Bypass, as follows:

    a.  For wiring under a raised floor, run the input conductors through the wireways ⒶＡ at the right or left side within the PDU with System Bypass to the main input circuit breaker of the PDU with System Bypass.



    b.  For overhead wiring, run the cable directly to the main input circuit breaker of the PDU with System Bypass.

**A licensed electrician must connect the input wiring to the PDU with System Bypass:**

9. At the main input circuit breaker, connect the input wiring to the PDU with System Bypass circuit breaker terminals for phase L1, L2, and L3, according to the following color-coding:

| Input Voltage | L1 | L2 | L3 |
|:---:|:---:|:---:|:---:|
| **208 V** | Black | Red | Blue |
| **480 V** | Brown | Orange | Yellow |
| **600 V** | Red | Black | Blue |

⚠️ **Warning**

Tighten the lugs on the circuit breaker terminals only to the torque specified on the circuit breaker's label.

10. Connect the equipment ground wire to the lug on the bracket next to the circuit breaker.

11. Connect the GEC to the second lug on the bracket next to the breaker and connect to building steel.
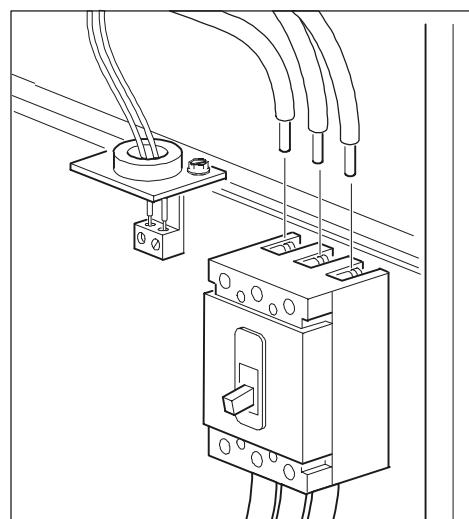
# Symmetra 3-Phase UPS

⚠️ **Warning**

**Only qualified personnel trained by APC may connect the Symmetra 3-Phase UPS to the PDU with System Bypass.**

## Tools required

| Tool Required | Supplied? |
|---|---|
| 13 mm socket wrench | No |
| 17 mm socket wrench | No |
| T-20 screwdriver | No |
| Standard screwdriver | No |

## Position, level, and attach the Symmetra 3-Phase UPS

Before connecting the Symmetra 3-Phase UPS, you should first position and level it and then join the Symmetra 3-Phase UPS to the PDU with System Bypass. See "Exchange side panels" on page 32, "How to level an enclosure" on page 44, and "Join the Symmetra 3-Phase UPS enclosure to the PDU with System Bypass enclosure" on page 33.

## Ensure that all power is off

⚡ **Electrical Hazard**

**Before electrical installation begins, ensure that power is off by following the procedure below:**

1. Set utility power to the OFF or Locked Out position.
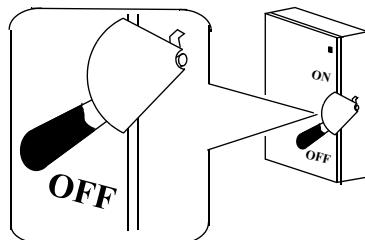


2. Open the DC breaker and set the System Enable switch on the Symmetra 3-Phase UPS to the Off position.
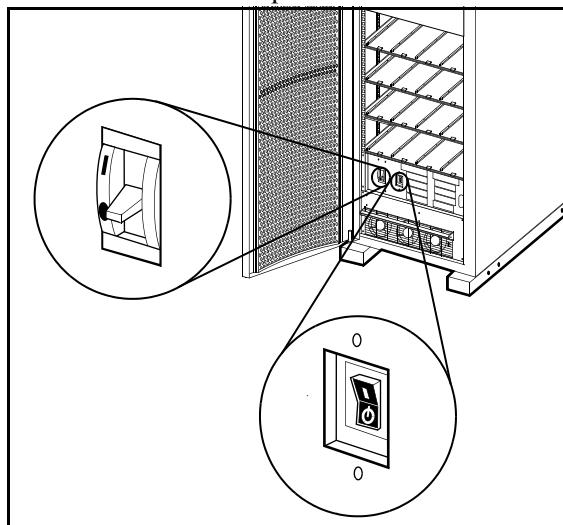
3. Open the Main input circuit breaker on the PDU with System Bypass.
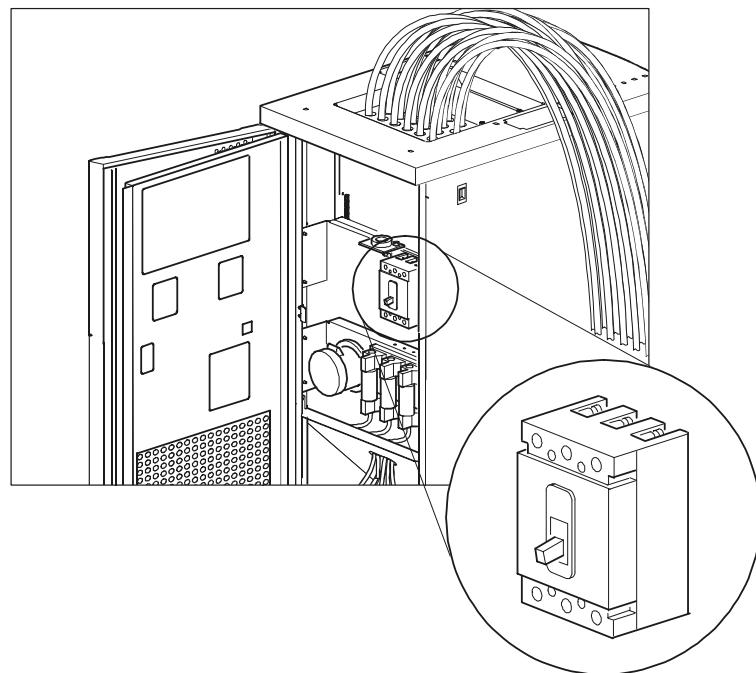


4. Open the Q1, Q2, and Q3 breakers on the PDU with System Bypass.
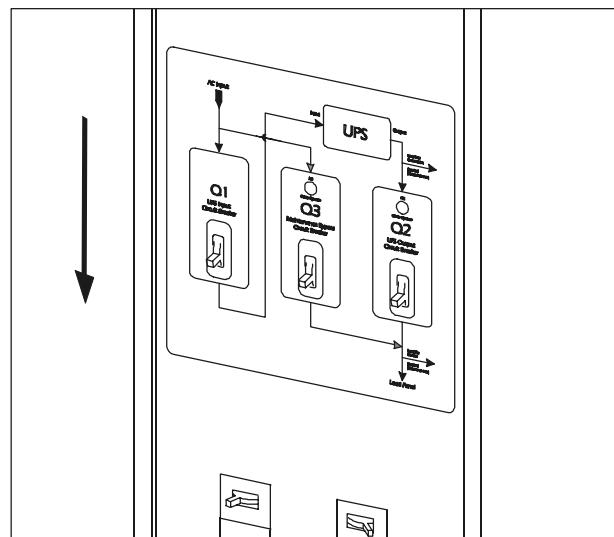


> **Note** Perform all power wiring before installing modules into the Symmetra 3-Phase UPS.

**Connect the PDU to the UPS**

⚠️
**Warning**

**Only qualified personnel trained by APC may connect the Symmetra 3-Phase UPS to the PDU with System Bypass.**

Attach power wiring to and from the Symmetra 3-Phase UPS. The power wires are coiled in the bottom of the PDU with System Bypass. Five input wires are at left and four output wires are at the right. Both sets are labeled with colors: black for L1, red for L2, blue for L3, white for neutral, and (input only) green for the equipment ground wire.

(!)
**Note**

Refer to the wiring diagram on page 41 as you follow this procedure:

1. Remove the back lower panel of the Symmetra 3-Phase UPS.
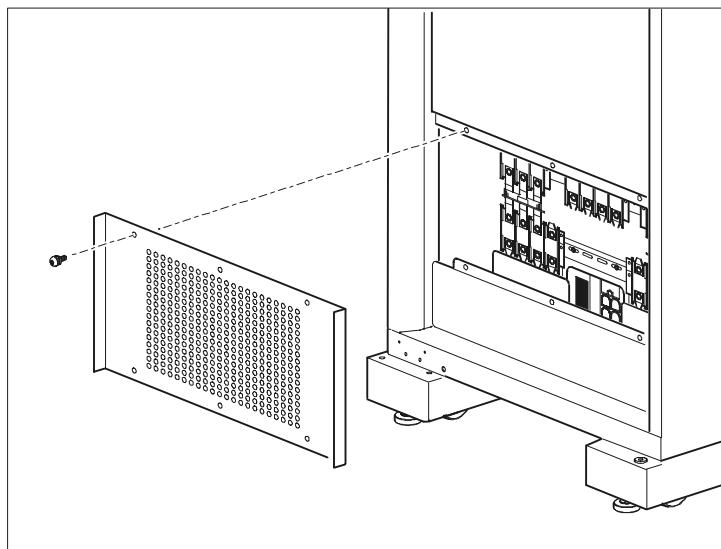


2. Use the opening in the side panels of the PDU with System Bypass and Symmetra 3-Phase UPS to run the wires between the units.

3. Attach the equipment ground wire from the PDU with System Bypass to the ground stud below the input terminal block at right on the Symmetra 3-Phase UPS (❸).

4. Attach the neutral wire and the input wires for the phases to the connectors with the corresponding colors and labels on the input terminal block at right on the Symmetra 3-Phase UPS (❹).

5. Attach the neutral wire and the output wires for the phases to the connectors with the corresponding colors and labels on the output terminal block at left on the Symmetra 3-Phase UPS (❺).

6. Connect EPO control wires from the PDU with System Bypass to the EPO board on the Symmetra 3-Phase UPS (❻).

7. Connect Maintenance Bypass control wires from PDU with System Bypass to the Maintenance Bypass interface board (❼) of the Symmetra 3-Phase UPS .

GEC  G  L1  L2  L3

Main.
Bypass

EPO

L1
L2
L3
N

L1
L2
L3
N
G

**PDU**

**UPS**

❸

❹

L1  L2  L3  N
AC INPUT

❺

L1  L2  L3  N
AC OUTPUT

❻ **EPO / PCB**

4  3  2  1        8  7  6  5

14 13 12 11 10 9  8  7  6  5  4  3  2  1

❼ **MAINTENANCE BYPASS / PCB**

1  2  3  4  5  6  7  8  9  10 11 12 13 14

9  10 11 12 13 14
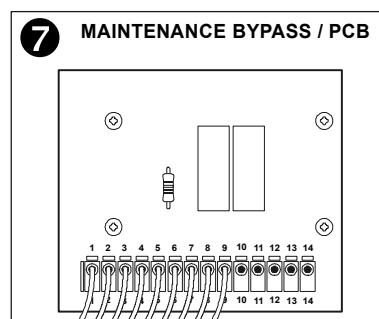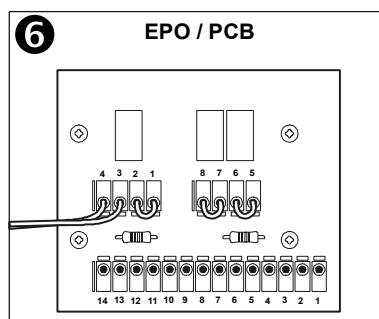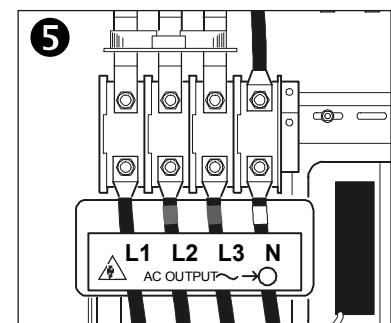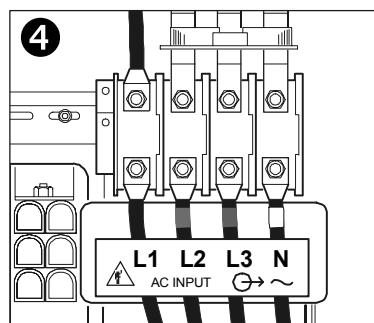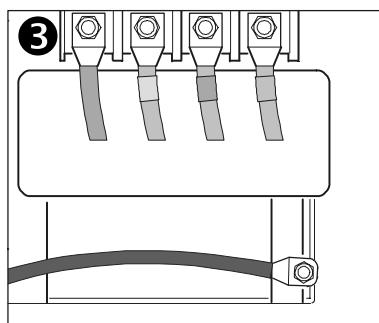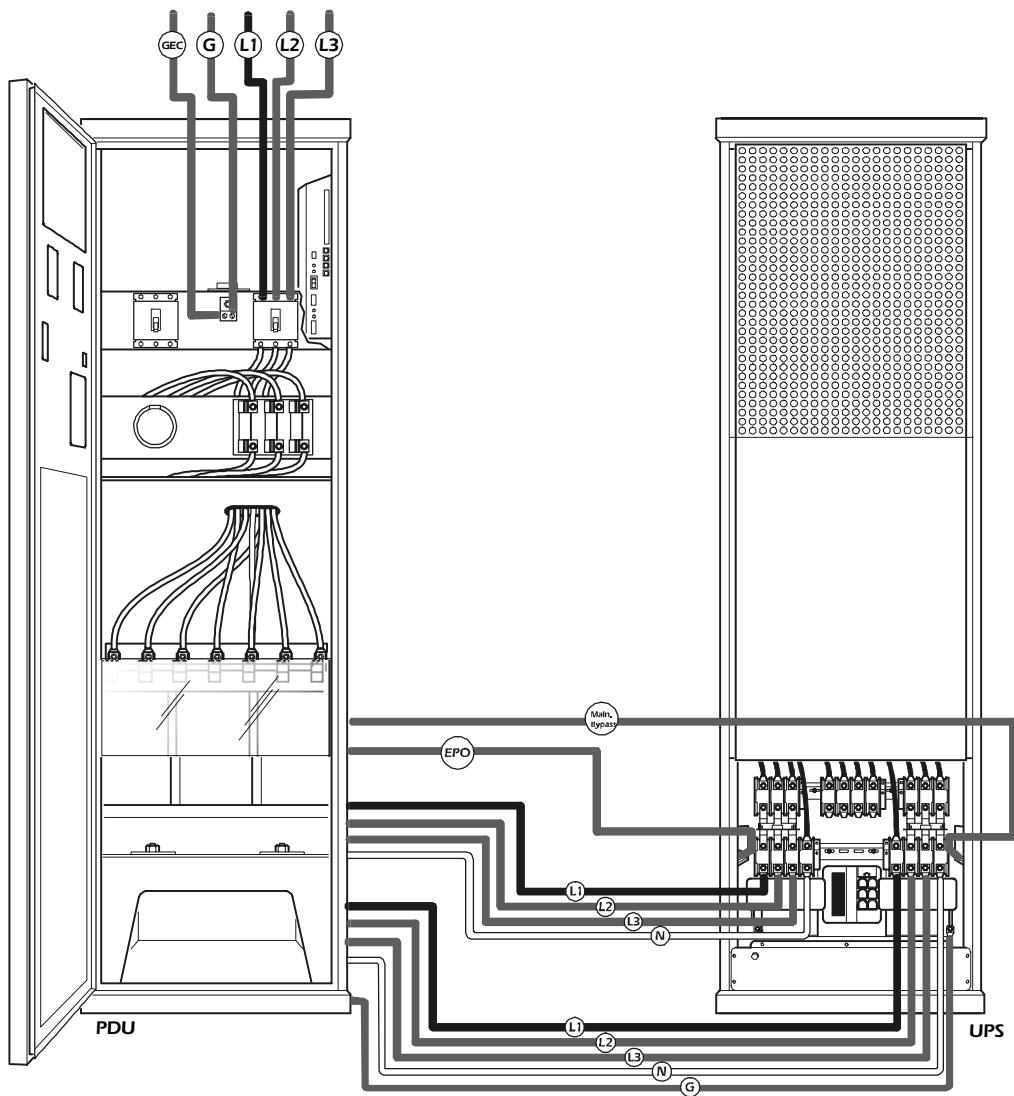
# Emergency Power-Off Switch

**Choose a connection method**

Choose only one connection.

**Note**

Emergency power-off can be achieved with any one of the following four methods:

- Applying 120 VAC
- Applying 24 VDC
- Applying 24 VAC
- Contact closure

APC recommends contact closure.

### EPO User Interface
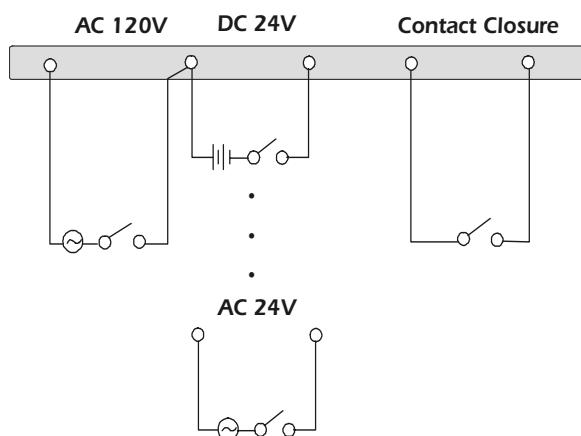
Hazardous voltage from the branch circuit must be isolated from the 24 Vac, 24 Vac and contact closure.  24 VAC and 24 VDC are considered a Class 2 circuit as defined in Article 725 of the National Electrical Code (NFPA 70) and Section 16 of the Canadian Electrical Code (C22.1).

A class 2 circuit is a source having limited voltage and energy capacity as follows:

a. If an Inherently Limited Power Source, voltage and energy are limited to < 30 VAC, < 60 VDC, 8 A.

b. If Not Inherently Limited Power Source, voltage and energy are limited to < 30 VAC, < 60 VDC, 250 VA, and the current is limited to 1000/Vmax.  The fuse is limited to 5 A if < 20 VAC or 20 VDC, or 100/Vmax if < 30 VAC or 60 VDC.

If choosing to use 24 VAC, 24 VDC or contact closure to perform the EPO function, the wires should be UL Listed, type:

- CL2 Class 2 cable for general purpose use;  or
- CL2P Plenum cable for use in ducts, plenums and other space used for environmental air;  or
- CL2R Riser cable for use in a vertical run shaft from floor to floor;  or
- CL2X Limited Use cable for use in dwellings and for use in raceway.

- For installation in Canada, the cable should be CSA Certified, type ELC (extra-low-voltage control cable).
- If CL2 cable is not used, the EPO wiring is to be routed in conduit. The conduit should not contain any hazardous branch circuit wiring.

**Connect a switch to the EPO interface**

1. Connect the switch to the EPO interface mounted on the bottom of the PDU with System Bypass rear panel. (See "Choose a connection method" on the previous page for guidance).
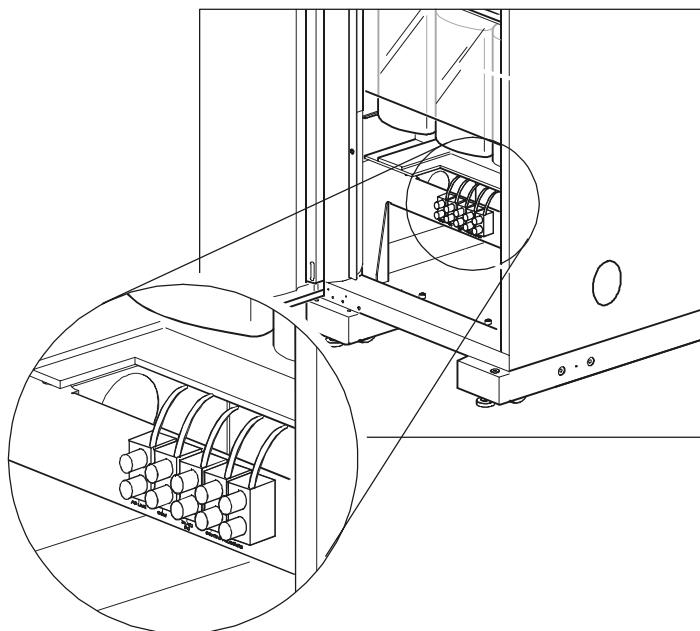


> **(!)** **Note** The default setting on the EPO interface is for a normally open switch.

2. If you are attaching a normally closed switch:

   a. access the monitoring unit through the back doors of the PDU with System Bypass. The arrow in the illustration below points to the PDU with System Bypass monitoring unit.
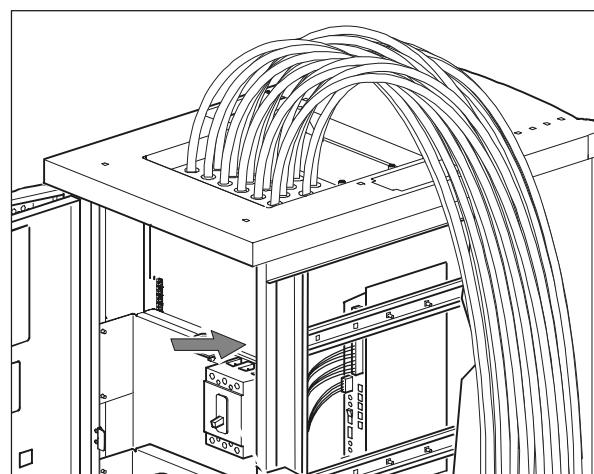


   b. Flip the EPO DIP switch on the PDU monitoring unit to change the default setting from a normally open to a normally closed setting.

3. On the PDU monitoring unit, ensure that the TEST/ARM rocker switch is in the ARM position.

# NetShelter VX Enclosures

**Tools required**

| Tool Required | Supplied |
|---|---|
| Standard screwdriver | No |
| Phillips screwdrivers (various sizes) | No |
| Metric socket wrench or adjustable open-ended wrench | No |
| Metric hex drives | No |
| 5mm allen wrench | Yes |
| Level | No |
| Open-ended wrench (13 mm/14 mm, for adjusting the leveling feet of the enclosure) | Yes |

**(!) Note**  Do not discard the open-ended wrench with the packaging of the enclosure!

**Position the enclosures**  Position the first enclosure to the right or left of the PDU with System Bypass, depending on the location of the Symmetra 3-Phase UPS, and place each additional enclosure after the first to form a row. After placing the enclosures in the desired position, level, stabilize (if necessary), and join enclosures before installing any equipment.

**How to level an enclosure**  Leveling feet are attached under the enclosure at each corner. The leveling feet can help provide a stable base if the selected floor space is uneven, but they are not intended to compensate for a badly sloped surface. The feet and casters can also be completely removed to allow the enclosure base to rest directly on the floor.

**Leveling procedure.**

1. Fit the 14-millimeter end of the open-ended wrench (included) to the hex nut just above the round pad of the leveling foot. Turn the wrench clockwise to extend the leveling foot until it makes firm contact with the floor.
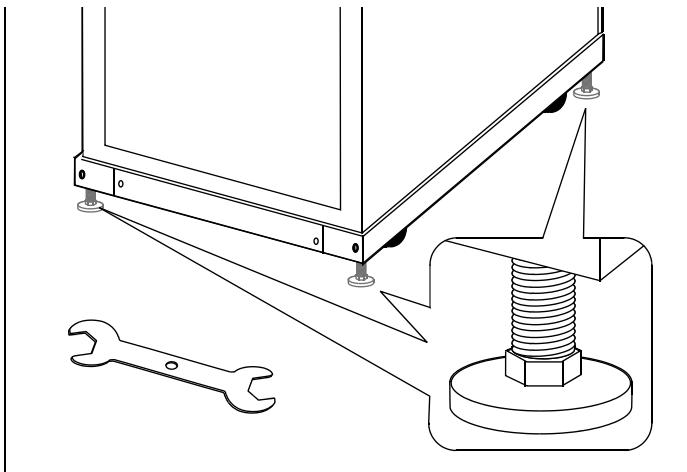


2. Repeat step 2 for each of the remaining leveling feet.

3. Use a level to determine which feet need further adjustment to level the enclosure. Adjust as necessary.

> ⚠️ **Warning**
> Do not move the enclosure after the leveling feet are lowered—the leveling feet may bend.

### How to stabilize the enclosure

American Power Conversion offers two additional products for stabilizing enclosures:

- Stabilizer Plate Kit (AR8115ABLK)—one plate and mounting hardware for attaching to the enclosure frame. One plate can be installed in front and two plates can be used on each side. Stabilizer plates may also be bolted to the floor to add stability.
- Bolt Down Bracket Kit (AR8112BLK)—four brackets and mounting hardware for attaching to the enclosure frame on the sides (exterior or interior). These brackets must be anchored to the floor to provide stabilization.

### How to join enclosures together

You can expand your installation by joining an expansion enclosure to a base enclosure or two expansion enclosures together. The procedure involves removing one side panel of the base enclosure and attaching it to the open side of the expansion enclosure. The expansion enclosure consists of expansion hardware and vertical baying trim that covers the gap between the joined enclosures for a finished appearance.

**Before joining enclosures.** Sometimes you must change enclosure configurations before joining enclosures together. Often this means reversing the front door on one of the enclosures or moving the trim from one side of an enclosure to the other.

**Preliminary steps for joining enclosures.**

1. Reverse the door, if necessary. (See "How to reverse the door" on page 135.)

2. Remove the side panel from the existing enclosure or bay if necessary. (See "How to remove and install the side panels" on page 131.)

3. If necessary, move the vertical baying trim from one side of the expansion enclosure to the other side. (See "How to move the vertical baying trim" on page 141.)

**How to join enclosures.**

1. Connect the four baying brackets pre-installed on the expansion enclosure to the base enclosure:

   a. Using the 5 mm Allen wrench (included), loosen the socket-head screw that is holding the baying bracket to the expansion enclosure.

b.  Rotate the bracket from its original position ❶ to its new position ❷.
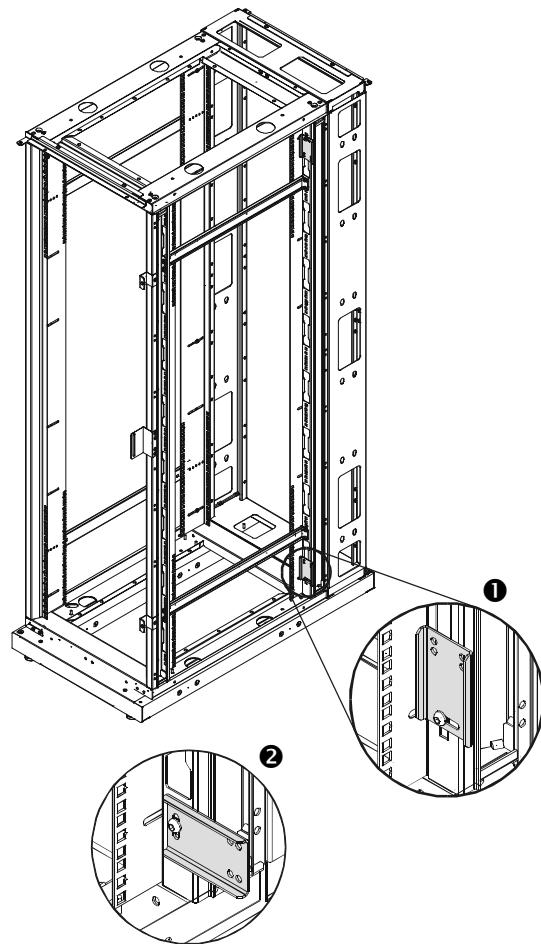


c.  Push the two enclosures together until the holes in the free end of the baying bracket are aligned with holes in the frame post of the base enclosure.The outer holes on the baying brackets are used when installing on 24-inch raised-floor tiles, and the inner holes on the baying brackets are used when installing on 600-millimeter raised-floor tile.

d.  On the base enclosure, insert a caged nut into the holes that align with the holes in the expansion bracket.

e.  Repeat steps a–d for each expansion bracket.

f.  On the base enclosure, insert a socket-head screw through the holes in the bracket, the frame post, and caged nut. Hand-tighten the screw.

> ⚠ **Note**  Do not fully tighten the screws at this time. They will be secured after all four mounting brackets have been installed.

g.  Repeat for the three remaining baying brackets.

2.  Align the two enclosures as closely together as possible and then tighten all socket-head screws on each of the four baying brackets.

3.  Reinstall any side panels, as required. Side panels removed from base enclosure can be used on the expansion enclosure.

# Cable Troughs, Partitions, and Ladders

**Troughs and partitions for overhead wiring along rows**

If you ordered APC cable troughs, partitions, and ladders to route overhead wiring for your PowerStruXure system, you must assemble the power cable troughs and the data cable partitions along the rows of enclosures and assemble the ladders between rows.

**Power cable troughs.** Each power cable trough is two feet in length and is not adjustable. There are two types of power cable troughs:

Ⓐ The PDU power cable trough sits atop the PDU with System Bypass and has an opening in one end to fit around the power cables where they exit the PDU with System Bypass.

Ⓑ TheNetShelter VX power cable troughs have an opening in each side through which you can route data cables to the data cable partitions.
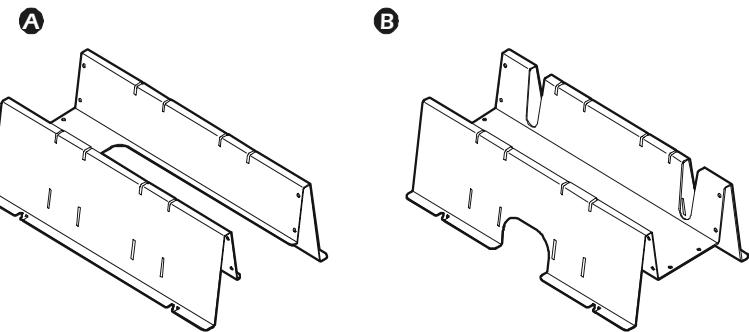


**Data cable partitions.** There are two types of data cable partitions, each of which forms a side wall of a trough for data cables. You can customize the width of the trough for each row of your system—wider for rows carrying many data cables, narrower for rows carrying fewer.

A data cable trough for each row must use, as its back wall, a partition that contains an opening (Ⓒ) for routing data cables.
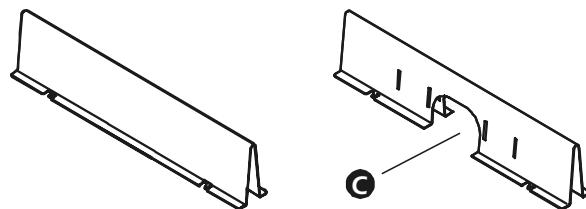
**How to install power cable troughs**

Use the procedure in this section for both the PDU and NetShelter VX power cable troughs. Make sure you install the PDU power cable trough on the PDU with System Bypass.

> ⓘ **Note**
>
> When installing NetShelter VX power cable troughs, be sure that the opening for routing data cables is facing the **front** of the enclosure.

Install power cable troughs along the back edge on the roof of each row of enclosures. To install:

1. Insert the rear set of fastening tabs into the square holes along the top back of the unit.

2. Squeeze the sides of the section towards each other at the bottom to insert the front fastening tabs.
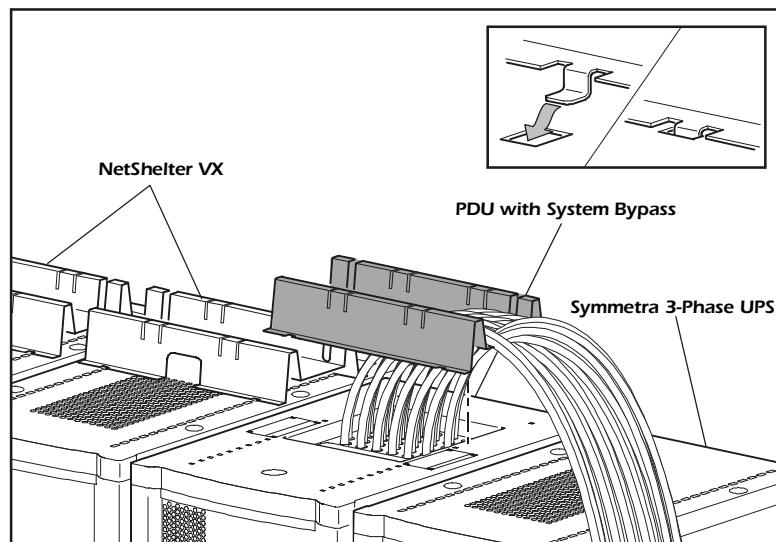


> ⓘ **Note**
>
> When installing the PDU power cable troughs, drape the power cables (whips) over the UPS as shown. After you have finished installating the troughs in the row, route the power cables using the troughs.

**How to install data cable partitions**

Use the procedure in this section to install all data cable partitions. You can install data cable partitions on any enclosure.

1. Squeeze the two sides of a partition to insert the fastening tabs into the set of square holes toward the back of the roof of the enclosure, next to the power cable trough sections already installed.
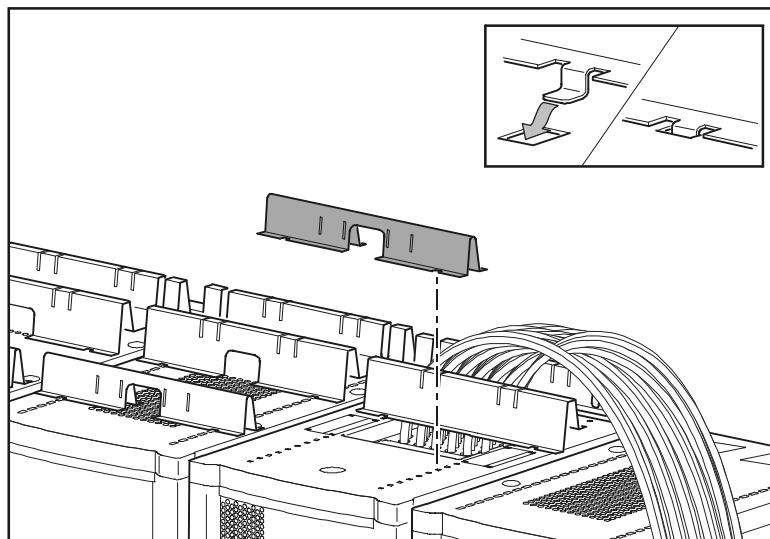
2. At the width you need for the data cable trough, install the other partition in the same manner at the front of the roof of the enclsoure.
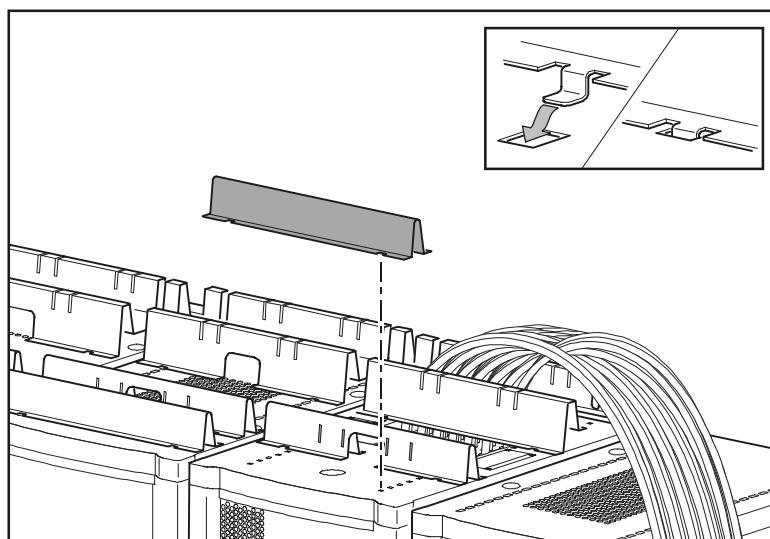
**Ladders for overhead wiring across rows**

After installing the power cable troughs and data cable partitions, install the ladders between rows of enclosures.

> **(!) Note**
>
> If you are installing more than one row of enclosures within the PowerStruXure system, you must install an overhead ladder.

Use wide (12-inch) ladders where many power cables or data cables will run between rows; use narrow (6-inch) ladders where few power cables or data cables will run between rows (e.g., to rows farthest from the PDU with System Bypass.)
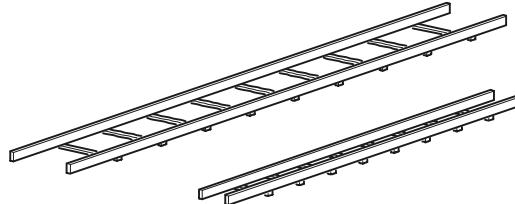


You can adjust the length of the ladders in the following ways:
- You can cut back the ends to shorten them by using a hacksaw
- You can extend their length several inches by inserting the connectors only partially into the side rails.

> **(!) Note**
>
> Do not change the spacing between rows and the length and physical positioning of the ladders from the basic layout you planned with your APC representative when you placed your order. For overhead wiring, each whip is provided at a pre-determined length to reach the enclosure whose devices it will support. Changes to the physical configuration of your PowerStruXure system could cause some power cables (whips) to be too short or too long.

**How to install ladders across rows**

To install the ladders for typical configurations:

1. On each side rail of the ladders, insert the ladder brackets.
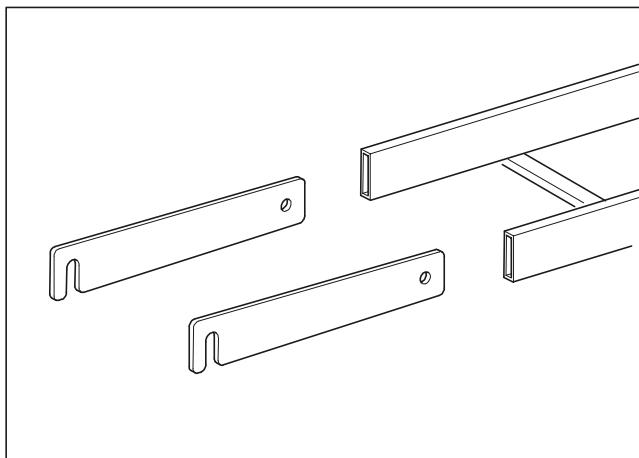


2. Attach the ladders to the troughs in one of the three (a–c) following ways:

   Ⓐ For two rows of enclosures that face front to front, do one of the following:

   • Use the ladder brackets to attach the 12-inch ladder to the slotted top of the power cable troughs of adjacent rows. The ladder runs above the data cable partition to span the rows and to carry power cables and data cables.
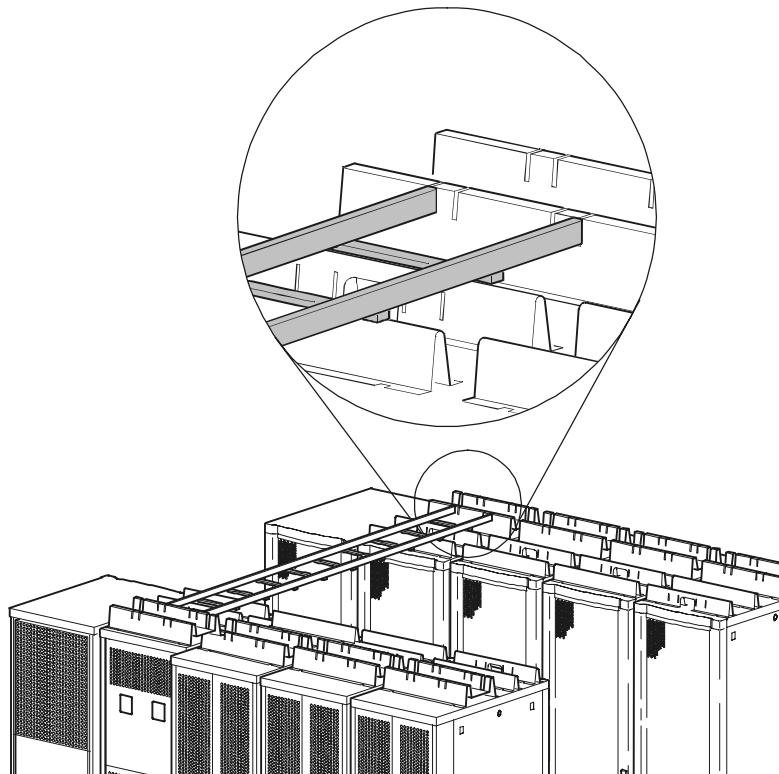
• Use two ladders, one attached between power cable troughs to carry power cables, and the other between data cable partitions to carry data cables.
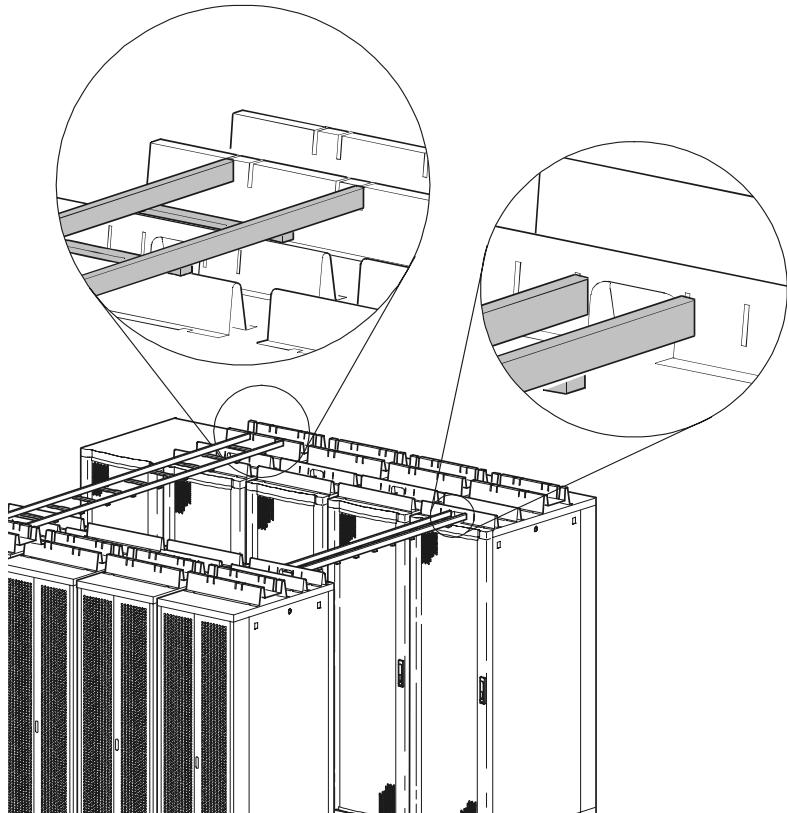
**ⓑ** For two rows of enclosures that face back to back attach the ladders as follows:

- Attach one ladder to the slotted top of the power cable trough to carry power cables across rows.
- Attach another ladder to the slots low on the side of the power cable trough at an opening for the data cables. This ladder will carry data cables after they are routed through the opening under the power cable trough.
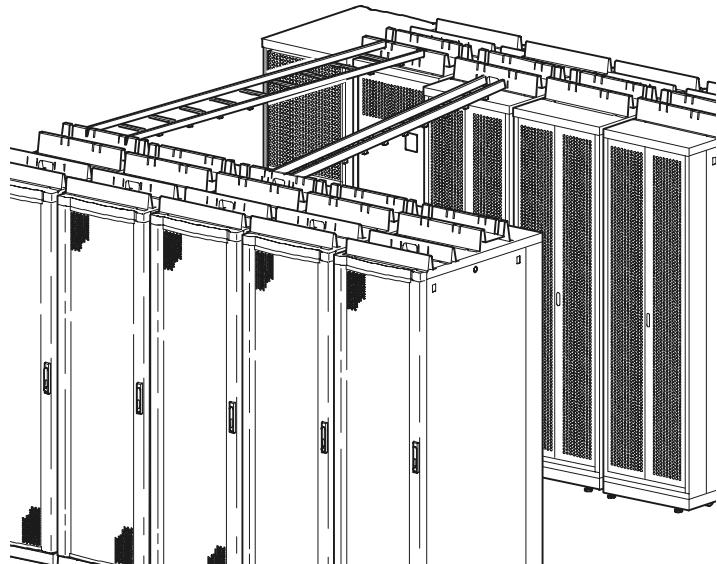


**ⓒ** Alternatively, you can mount the two ladders side by side, using the slots in the top edge of the power cable trough.
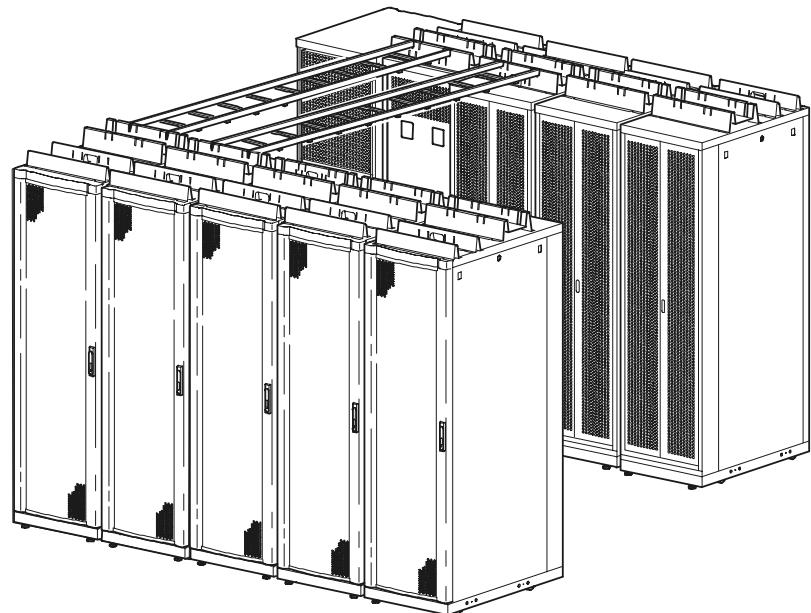
# Power Cables (Whips)

**Route and attach overhead wiring**

If you ordered overhead wiring, connect the prewired power cables of the PDU with System Bypass as follows:

1. Install the troughs, partitions, and ladders as described in "Cable Troughs, Partitions, and Ladders" starting on page 47 so that you can route power cables from the PDU with System Bypass to the NetShelter VX enclosures.

2. Find the numbers that indicate the enclosure to which each power cable will supply power. These numbers appear on the roof of the PDU with System Bypass where the power cables exit, and they also appear on the ends of each power cable.

   > **(!)** **Note** The enclosures are not numbered. Consult your APC PowerStruXure Configuration Buildout Tool to determine the enclosure associated with each power cable.

3. Beginning with the power cables for the enclosures farthest from the PDU with System Bypass, run each power cable within the power cable trough along the row and, if necessary, across one or more ladders to the enclosure to which it will provide power.

   > **(!)** **Note** Ensure that the L21-20 twist-lock connector at the end of each power cable always lies on top of any longer power cables in the trough.

4. Connect the appropriate power cable to APC power management equipment in the enclosure in one of the four following ways:
   – For single-feed devices without redundancy, attach a power cable directly to a Metered Rack-Mount PDU installed in a NetShelter VX enclosure.
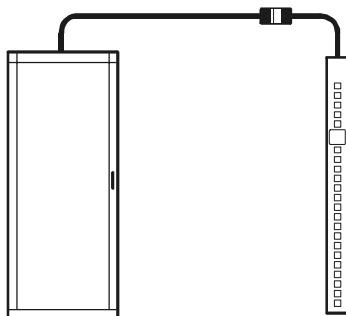


   – For dual-feed devices within a redundant system, attach a power cable from each PDU with System Bypass into two different Metered Rack-Mount PDUs in the NetShelter VX enclosure.
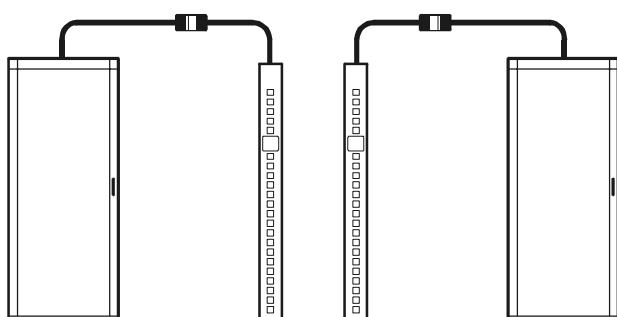
– For single-feed devices within a redundant system with an Automatic Transfer Switch, connect a power cable to the Automatic Transfer Switch (A and B feeds) and connect the Automatic Transfer Switch power cord to a Metered Rack-Mount PDU in the NetShelter VX enclsosure.
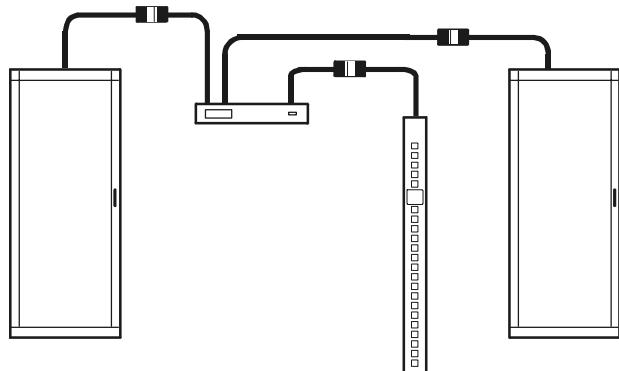


– For dual-feed devices in a redundant system with an Automatic Transfer Switch, connect a power cable from each PDU with System Bypass to the Automatic Transfer Switch's A and B feeds, and another power cable from one PDU with System Bypass to a Metered Rack-Mount PDU, and the Automatic Transfer Switch's power cord to a second Metered Rack-Mount PDU in the NetShelter VX enclosure.
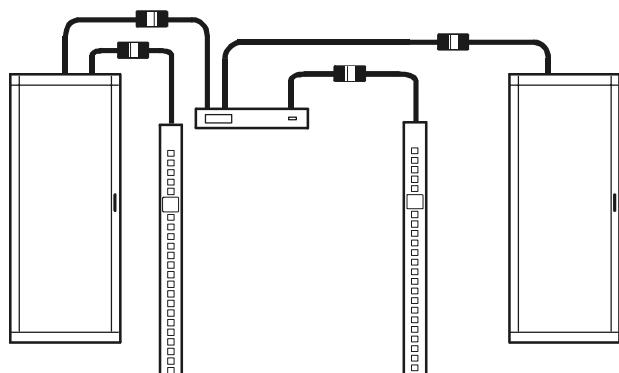


**Note**

Lay the cables neatly in the trough to minimize cable build up. If they are not laid neatly, all the cables will not fit.

5. From each NetShelter VX enclosure, run the power cable of the appropriate APC power management device out the roof of the enclosure, through the notch in the rear side of the power cable trough, to the connector of the appropriate power cable from the PDU with System Bypass. Plug the two twist-lock connectors together, and twist them clockwise to lock.
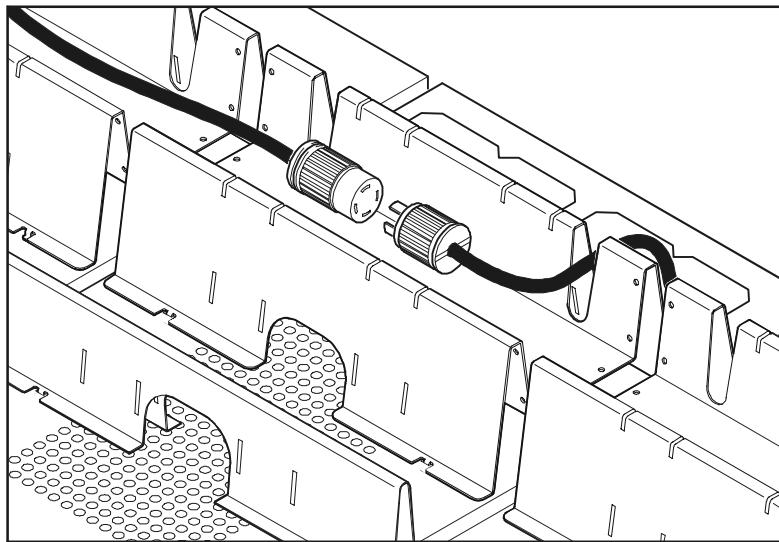
### Wiring under the floor

**A licensed electrician must route and connect the power cables for under-floor wiring.**

If you plan to route the power cables (whips) to the enclosures under a raised floor, you must provide the appropriate power cables and equipment for installation, and a licensed electrician must route and connect the power cables to the circuit breakers of the PDU with System Bypass. To wire each cable to an enclosure:

1. Push out a knock-out filler in the floor of the PDU with System Bypass to create an opening for the cable.
2. Install Liquidtite™ waterproof conduit under the floor from the enclosure to the PDU with System Bypass.
3. From the Metered Rack-Mount PDU or Automatic Transfer Switch in the enclosure, thread a four-wire cable with ground from the enclosure through the Liquidtite conduit to the PDU with System Bypass.
4. At the PDU with System Bypass, route the four-wire cable with ground through the opening you created in step 1 and then up through the wireways at the left or right side within the PDU with System Bypass. This will allow you to connect the four-wire cable to the breaker panel.
5. At the breaker panel, cut the wires to the proper length, connecting the three "hot" wires to a properly sized three-phase circuit breaker on the PDU with System Bypass.
6. Connect the neutral wire to the neutral bar and the ground wire to the ground bar.

**Make sure all wire connections and circuit breaker connections are properly torqued.**

# 3-Phase Automatic Transfer Switch

**Placement**

Reserve the top 1U space (for overhead wiring) or bottom 1U space (for under-floor wiring) in the NetShelter VX enclosures for the Automatic Transfer Switch.

**Attach mounting brackets**

1. Attach the left and right mounting brackets to the unit, using two flat-head, Phillips screws (provided) for each bracket.

   ⊙ **Note**    Place the brackets flush with the front of the rack to leave room for routing cables.
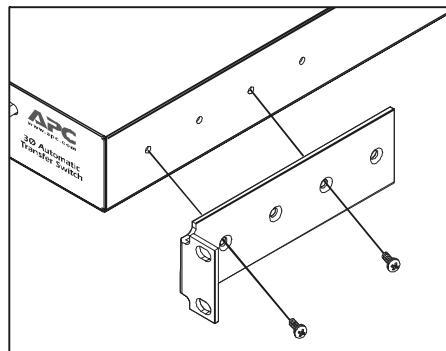


**Disassemble segments of the adjustable bracket**

The adjustable brackets are necessary only if you are using a four-post enclosure or rack. If you are using a two-post rack, the Automatic Transfer Switch is supported by the mounting brackets alone.

1. Disassemble each adjustable bracket by removing the slide screw and nut.
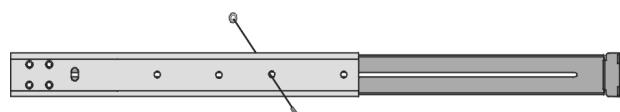


2. Set the screws, nuts, and the adjustable bracket segments aside.

**Attach rear segments to the rack**

1. Insert caged nuts (included) on the enclosure's rear vertical mounting rails at your chosen location.

2. Align the rear segments of the adjustable bracket with the caged nuts you inserted in Step 1.

3. Insert mounting screws (included) and tighten.
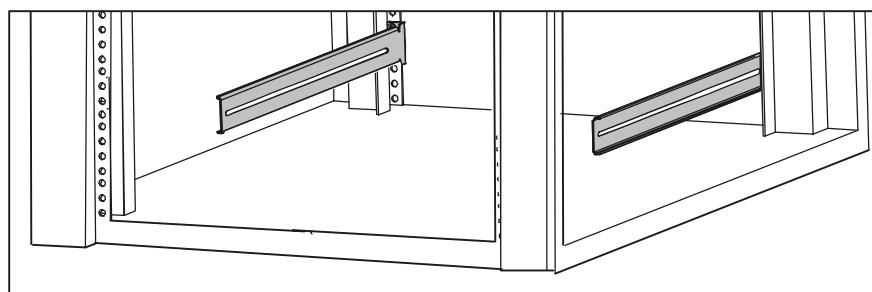
**Attach front segments to the switch**

1. Align the front segments of the adjustable bracket with the four holes on the sides of the switch.

2. Attach both front segments to the switch using four Phillips pan-head screws and washers (provided) for each bracket segment.
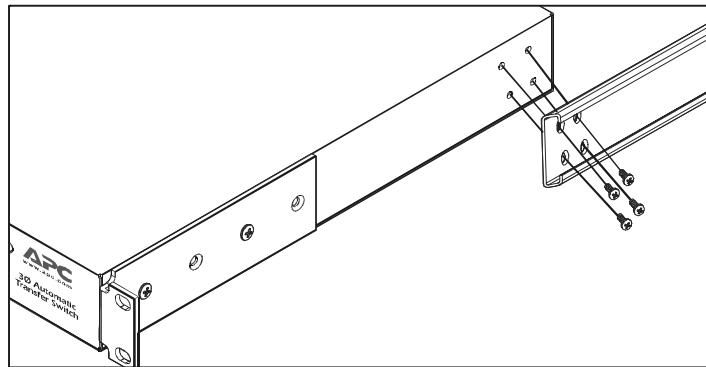


**Mount the Automatic Transfer Switch in the enclosure**

 **Two people should perform this step.**

**Warning**

1. Position the Automatic Transfer Switch in front of the mounted rear adjustable bracket segments.

2. Align the front and rear adjustable bracket segments and slide the front segments onto the rear segments.

3. Align the mounting brackets of the Automatic Transfer Switch with the front vertical mounting rails and insert caged nuts (included) in the appropriate holes on the front vertical mounting rails.

4. Insert mounting screws (included) and tighten.

5. Insert slide screws and nuts into each adjustable bracket and tighten to secure the positions of the adjustable brackets.
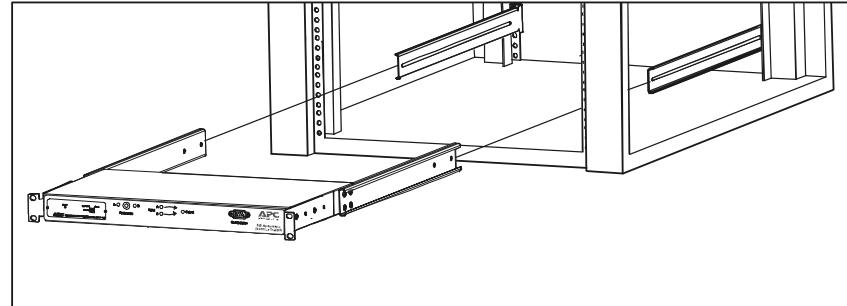
# Metered Rack-Mount PDU

**Mounting options**

You can install Metered Rack-Mount PDUs in one of two ways: using toolless mounting pegs or the mounting brackets. The Metered Rack-Mount PDUs are mounted in the rear of the enclosure, in the channel directly behind the rear vertical mounting rails. Before you begin to install the Metered Rack-Mount PDUs, choose a location for them in the enclosure and decide on the mounting method.

**Toolless mounting**

1. Slide the mounting pegs into the holes provided in the channel in the rear panel of the enclosure. Make sure the bottom pegs slide into the bottom holes in the enclosure.
2. Snap the Metered Rack-Mount PDU into place by pushing it downward until it locks into position.
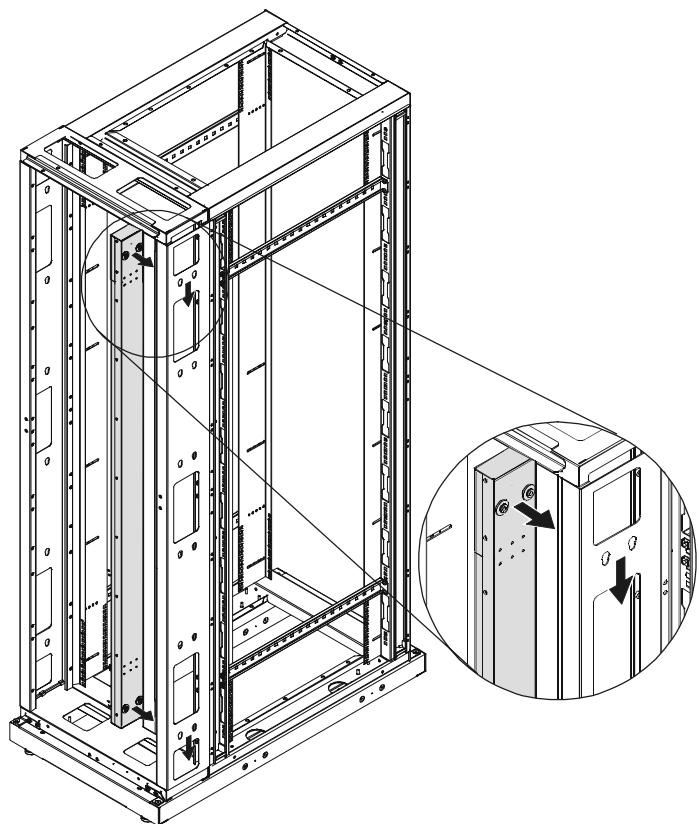
**Bracket-mounting**

You can attach a pair of brackets to the Metered Rack-Mount PDU in two different directions, shown in the figures in step 1. Consider the orientation of the Metered Rack-Mount PDU in the enclosure before attaching the brackets. A recessed orientation allows the Metered Rack-Mount PDU to be mounted flush with the enclosure; a raised orientation allows you to route cables through the channel (see the figures in step 2).

1. Attach two brackets to the rear of the Metered Rack-Mount PDU, using six pan-head screws (provided in the bracket kit) for each bracket.

   – Recessed Orientation
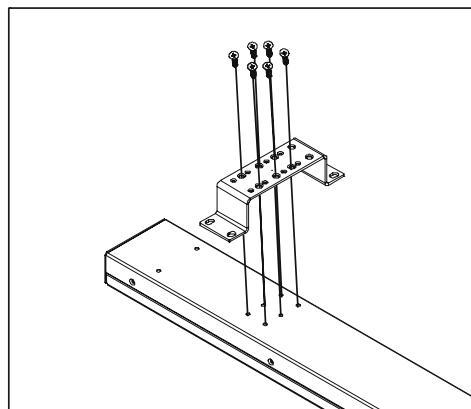


   – Raised Orientation
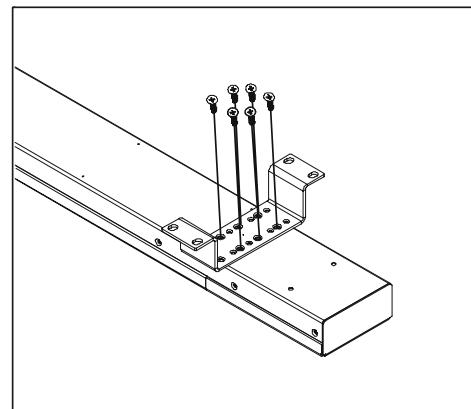
2. Insert one mounting screw (provided with the bracket kit) in the top and bottom positions in the channel where the brackets align with the holes. Tighten to secure the Metered Rack-Mount PDU to the enclosure.

– Recessed Orientation
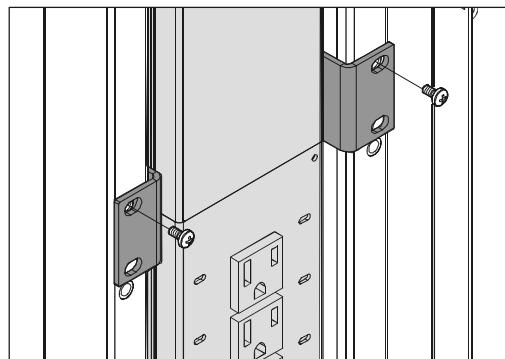


– Raised Orientation
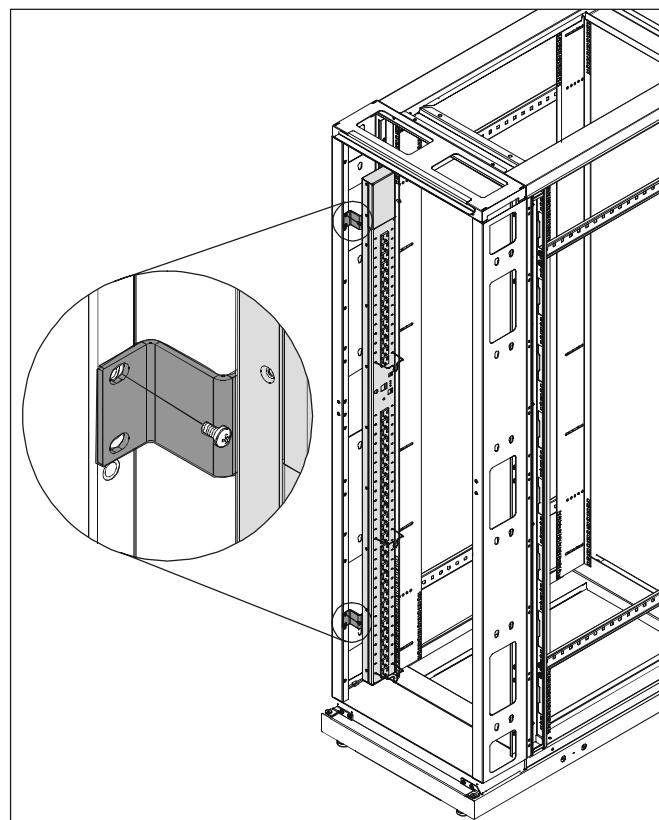
# Information Controller and Hub

The Information Controller and Hub will come pre-installed in the PDU with System Bypass. However, if at any time you need to install either or both of the units into a rack or PDU, follow the procedure in this section.

**Attach mounting brackets to the Controller and Hub**

1. Attach the left and right mounting brackets to the controller, using two flat-head, #2 Phillips screws (provided) for each bracket.

2. Attach the left and right mounting brackets to the hub, using three flat-head, #1 Phillips screws (provided) for each bracket.
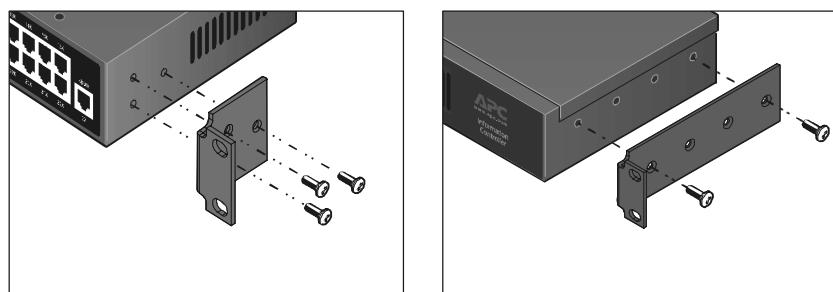


**Mount the Controller and Hub in the PDU with System Bypass**

The top 1U space in the PDU with System Bypass enclosure is reserved for the Information Controller Hub, and the second 1U space is reserved for the Information Controller. In the NetShelte VX, use the top two U spaces for the Information Controller and the Information Controller Hub. Use the following procedure for installing both components:

1. Insert caged nuts (provided with the enclosure) above and below the notched holes on the vertical mounting rails, occupying the reserved 1U space for the component you are installing in the enclosure.
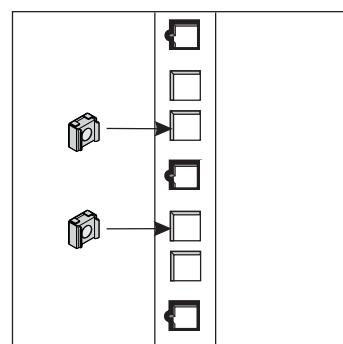


2. Plug the component into one of the provided power cords pre-installed in the PDU with System Bypass and slide it into place. If you are installing the component into a NetShelter VX or a rack, use the provided power cords.

3. Align the mounting holes on the brackets with the caged nuts you installed in Step 1, and insert two mounting screws (provided with the enclosure) to secure the brackets to the enclosure.

# System Start-Up

# Start-Up Procedure

**Important safety
information**

 Only qualified APC trained personnel may perform a system start-up.

 **Only those trained in the construction and operation of the equipment and the electrical and mechanical hazards involved may install and remove system components.**

**Ensure that power is off**

 **Before beginning the start-up procedure, ensure that power is off by following the procedure below:**

1. Open the DC breaker and turn off the System Enable switch on the Symmetra 3-Phase UPS.



2. Open the Main input circuit breaker on the PDU with System Bypass.

3. Open the Q1, Q2, and Q3 breakers on the PDU with System Bypass.



**Apply power to the system**

1. Apply utility power to the PDU with System Bypass.
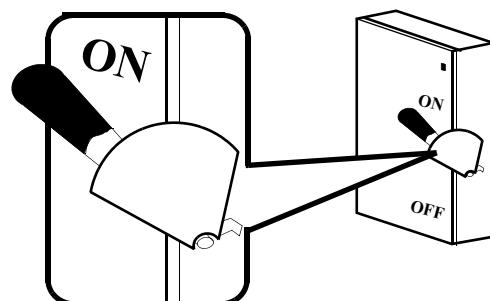


2. Check the phase rotation at the top of input breaker on the PDU with System Bypass to ensure that it is A-B-C clockwise rotation, using a phase rotation meter.

3. Close the main input circuit breaker on the PDU with System Bypass.
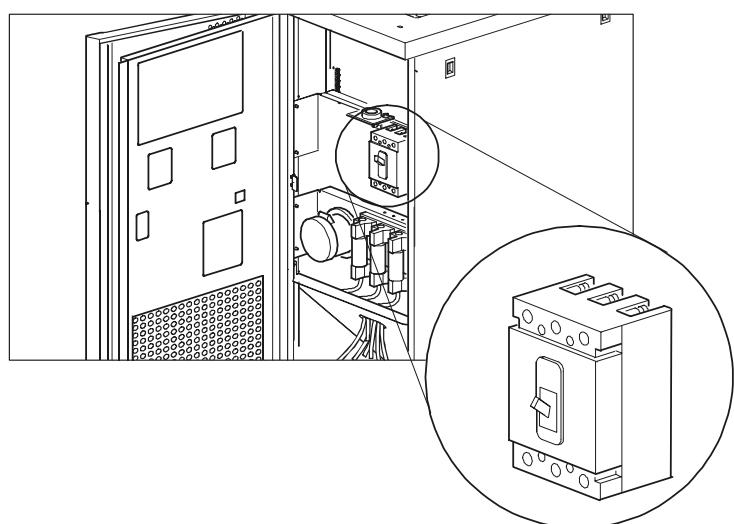
4.  Verify that the proper voltage is present at the transformer (208 V, metered phase-to-phase), using a True RMS voltmeter. Verify the correct phase rotation at the top of the transformer, to ensure that it is an A-B-C clockwise rotation, using a phase rotation meter.

⚡ **Electrical Hazard** **The DC bus in the Symmetra 3-Phase UPS is energized when battery modules are installed, even when the DC Disconnect breaker is open.**

5.  Install at least one battery module (4 battery units) in the Symmetra 3-Phase UPS. Install battery units four across, starting in the lowest available shelf. Position the battery unit to slide in, between the grooves, and push completely into the enclosure to ensure connection.
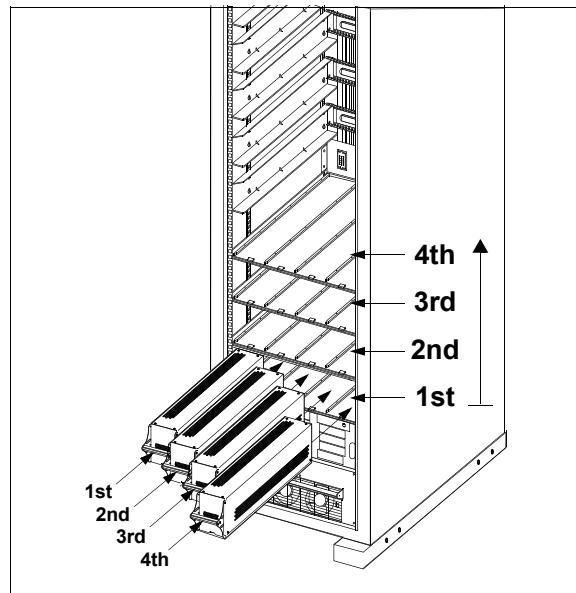
6. Install atleast one power module in the Symmetra 3-Phase UPS. Install power modules in the top 5 shelves, starting from the lowest available shelf. Push the module completely into the enclosure and secure:

   a. Tighten the screws on each side of the power module.

   b. Turn the locking latch on the right hand side of the enclosure clockwise until the arrow faces the power module.

**Note** The power module will not start unless the locking latch is engaged.
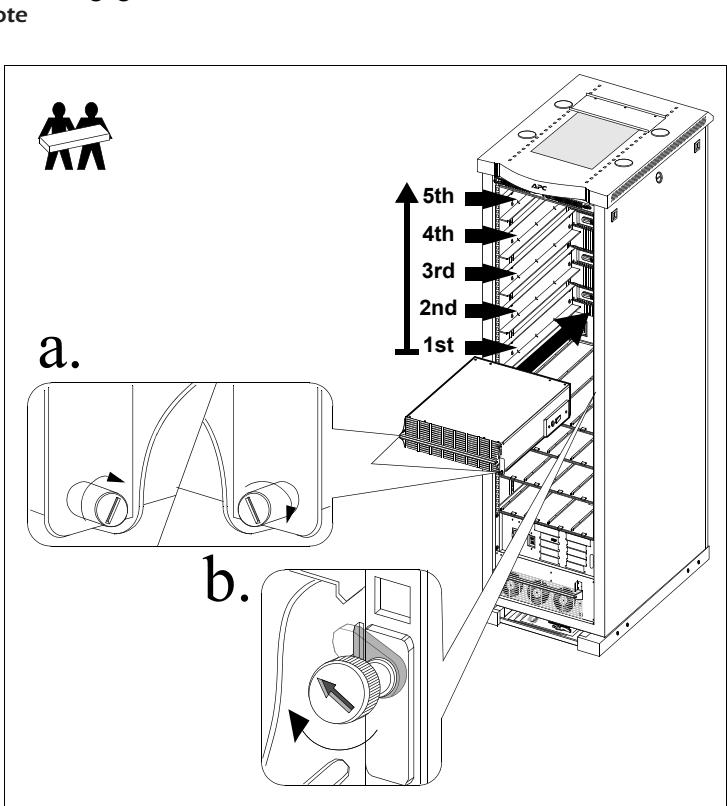


7. Apply AC power to the Symmetra 3-Phase UPS input by closing the Q1 breaker on the PDU with System Bypass.
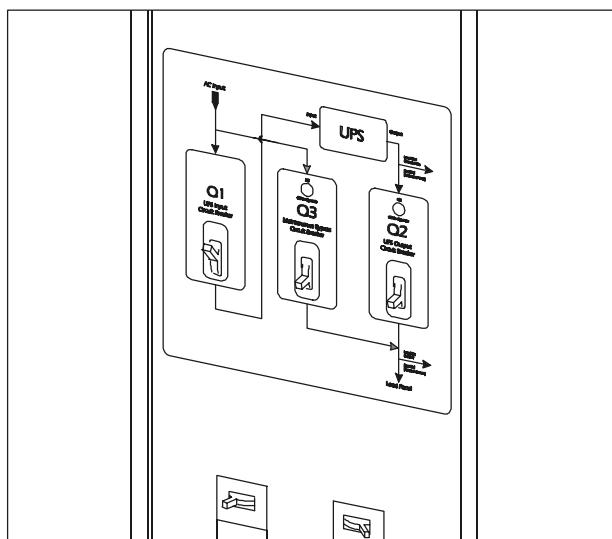
8.  Check phase rotation at the Symmetra 3-Phase UPS input terminal block, ensuring that it is A-B-C clockwise rotation, using a phase rotation meter.

9.  Close the DC breaker and turn on the System Enable switch on the Symmetra 3-Phase UPS.
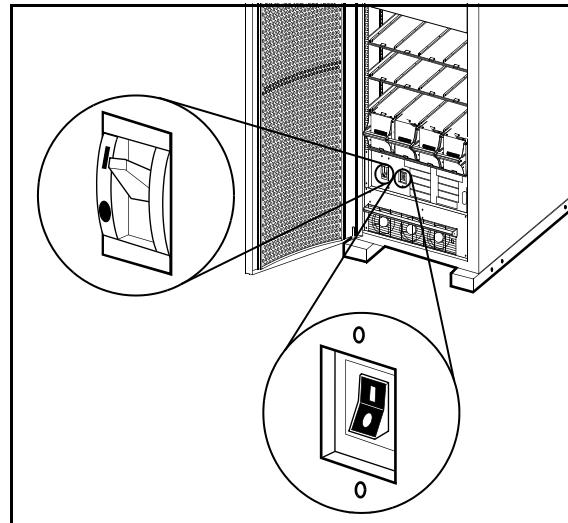


**Start the UPS using the display interface**

When the System Enable switch is placed in the ON position, the Startup screen appears on the display interface of the Symmetra 3-Phase UPS.

```
        PowerViewRM
     Rev: 0051 English


        Please wait...
```
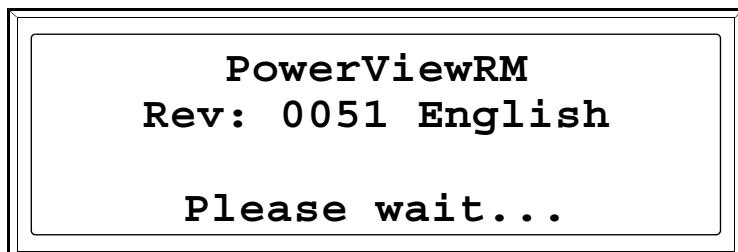
1.  Note any alarms listed on the display interface of the UPS and verify that they are appropriate for start-up conditions. See "Basic troubleshooting" on page 118 for more information.

2.  Referring again to the display interface, verify that the Symmetra 3-Phase UPS accepts the AC Mains input. After the display interface has established communication with the Symmetra 3-Phase UPS, the Monitoring screen appears.

```
Fuel%
Load%
In 000Vout Hz
Runtime: hr m
```
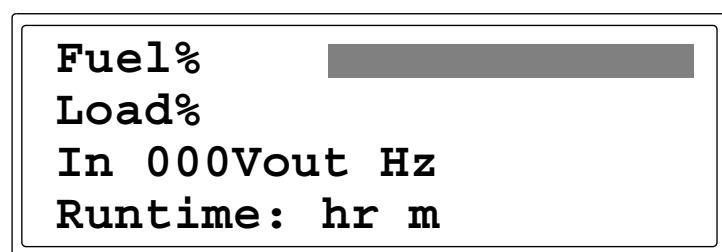
**Default Monitoring Information**

The factory default Monitoring screen displays the following status information.

| | |
|---|---|
| **Fuel Percentage** | The percentage of battery capacity (fuel) that is available. |
| **Load Percentage** | The percentage of system capacity that is being used to supply conditioned power to the load equipment. |
| **Voltage and Input Frequency** | The input voltage from mains power, the output voltage supplied to the load equipment, and the frequency of the input (mains) power. |
| **Run Time** | The run-time that can be expected of the batteries. The intelligence module calculates the run-time based on both the amount of power required by the load equipment and the capacity of the battery modules in the enclosure. |

3. Command the UPS to apply power to the load:

   a. Press the ESC key at the Monitoring screen to open the Main menu. This menu allows access to eight submenus:

   ```
   ➡ Control      Logging
      Status      Display
      Setup       Diags
      Accessories Help
   ```

   b. Move the selection arrow to the **Control** item and press the ENTER key.

   c. Move the selection arrow on the Contol menu to the **Turn UPS On** item and press the ENTER key.

   d. Confirm the selection on the next screen: move the selection arrow to the **Yes, UPS Load ON** item and press the ENTER key. The LOAD ON LED will illuminate and the display will show the following two screens:

   ```
         UPS has been
      commanded to turn
      load power on...
   ```

   ```
         UPS load is on

         Press any key...
   ```

**Verify proper phasing**

1. Place the Symmetra 3-Phase UPS into Static Bypass mode:

   a. Move the selection arrow on the Main menu to the **Control** item and press the ENTER key.
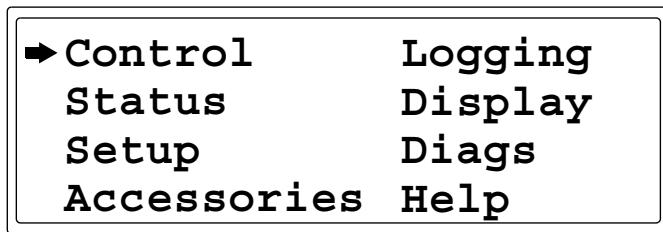
```
➡ Control      Logging
   Status      Display
   Setup       Diags
   Accessories Help
```

   b. Move the selection arrow on the Contol menu to the **UPS into Bypass** item and press the ENTER key.

   c. Confirm the selection on the next screen: move the selection arrow to the **Yes, UPS into Bypass** item and press the ENTER key. The BYPASS LED will illuminate and the display will show the following two screens:

```
      UPS has been
    commanded to go
    into Bypass...
```

```
    UPS is in Bypass

    Press any key...
```
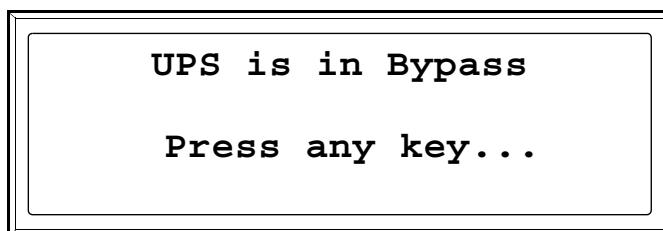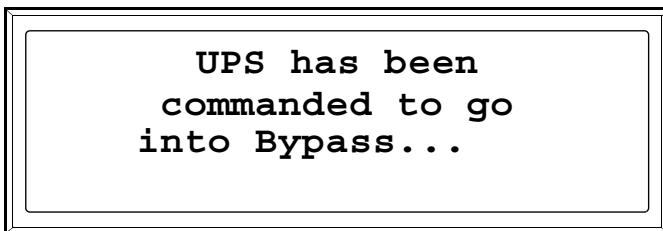
2. Check between the Q1 and Q2 breakers that there is no difference in potential between L1 in and L1 out, L2 in and L2 out, and L3 in and L3, using a True RMS voltmeter.

**Power the PDU distribution breakers**

1. Make sure all breakers are open on the PDU with System Bypass distribution panels.
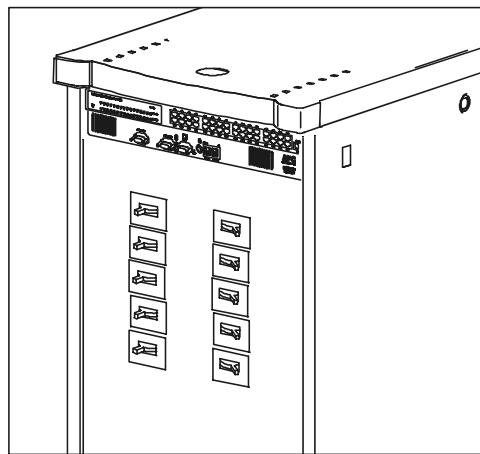


2. Close the Q2 breaker on the PDU. After Q2 has been closed, both distribution panels on the PDU with System Bypass will be energized.
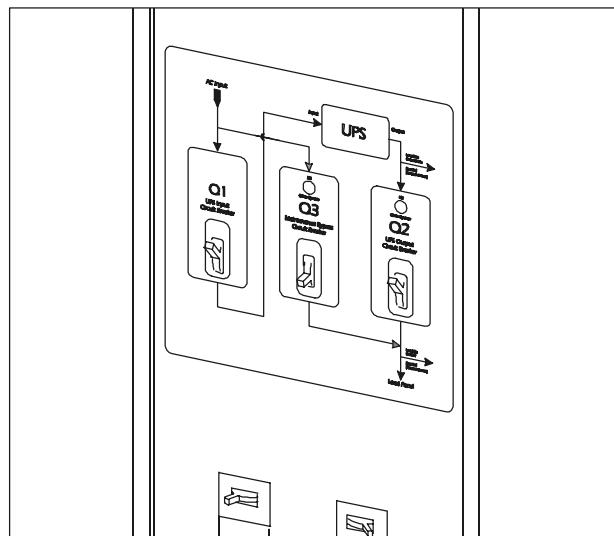


3. Apply power to the PDU with System Bypass power cords (whips) by closing the distribution breakers on the PDU with System Bypass.
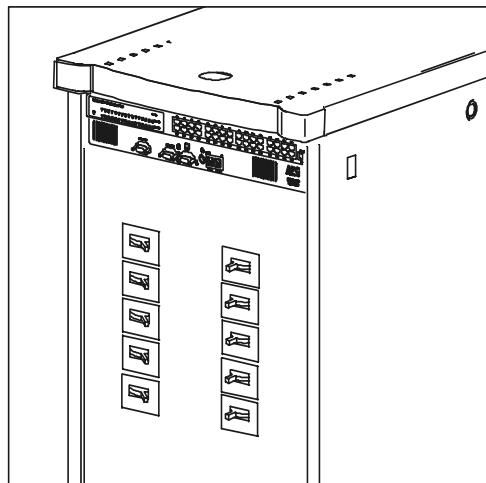
# Communication Connection

# Information Controller and Hub

**Connect network cables to PowerStruXure devices**

1. Connect a CAT 5 network cable (provided) to the Network ports on the Network Management Cards. The following devices have Network Management Cards:

    – 3-Phase Automatic Transfer Switch

    – Symmetra 3-Phase UPS

    – Environmental Monitoring Unit

2. Connect network cables (provided) to the 10Base-T ports on the Metered Rack-Mount PDU and on the PDU with System Bypass.

**Route network cables to the Information Controller Hub**

*Overhead routing.*

1. Install troughs and ladders as described in "Cable Troughs, Partitions, and Ladders" on page 47.

2. Run the CAT 5 network cables from each APC device to the Information Controller Hub in the top of the PDU with System Bypass.

    a. Run the connected network cable into the data cable trough and along the row toward the PDU with System Bypass.

    b. If necessary to reach the PDU with System Bypass, run the APC network cables for the entire row, bundled together with cable ties, across one or more ladders between rows. For the cables to reach a ladder, you may have to route them through the opening under the power cable trough for the row.
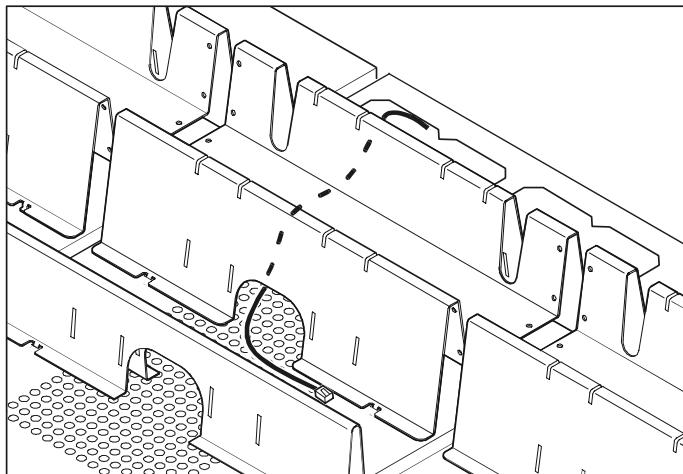
3. At the PDU with System Bypass:

a. Remove one of the two screws in the comb inside the PDU with System Bypass, and loosen the second screw.
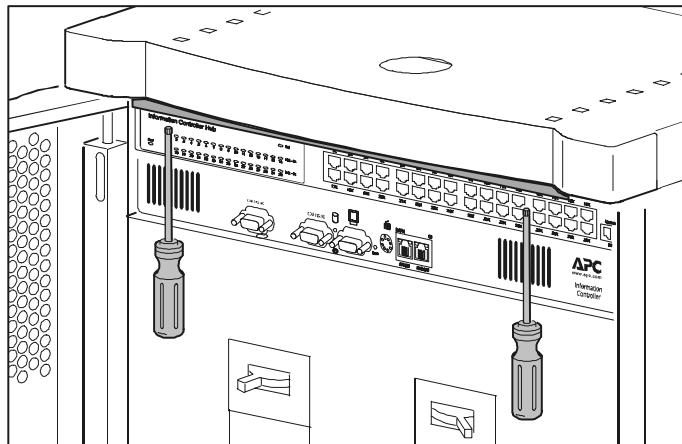


b. Swing the comb outward.
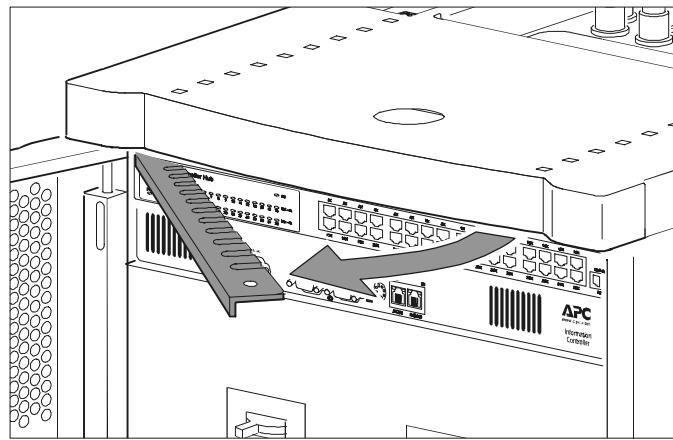


c. Route all the data cables through the opening (under the trough) and into the enclosure.
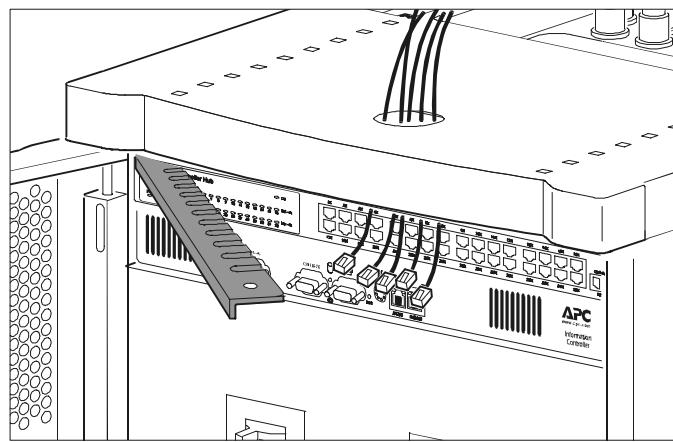


d. Press each data cable into a slot in the comb, leaving enough cable below the comb to allow you to plug it into the Information Controller Hub.

e. Reinstall the comb into the PDU with System Bypass.

4. Connect each APC device's network cable to any available station port in the Information Controller Hub.

Station ports are those with an *x* after the number (e.g., 2x).

**Note**

**Install and route data cables (alternative routing)**

> ⚠ **Note** — APC strongly recommends routing data cables overhead, as described in "Overhead routing" on page 77. Using APC data cable troughs and ladders is the best way to ensure that data transmission for your PowerStruXure system is free from the danger of induced voltages.

If you choose to route data cables under a raised floor, note the following precautions:

- Do not route data cables inside the PDU with System Bypass to the floor, either within the power cable conduit or in any other location. Induced voltages from the power cables may interfere with correct data transmission. You must route data cables out the roof of the PDU with System Bypass and down inside the first NetShelter VX enclosure to the floor.

- Induced voltages can also create problems under the floor when data cables run too close to any power cables. Even if data transmission is successful after the initial installation, later additions to power cabling under the floor for other equipment in your data center can jeopardize the integrity of the data transmission for your PowerStruXure system.

5. Apply power to all devices connected to the Information Controller Hub.

> ⚠ **Note** — Ensure that you log the serial number of each APC PowerStruXure device and where it is installed before you begin configuring the information controller.

6. After both the Status and Link LEDs on each connected Network Management Card have turned green, proceed to "Connect the Information Controller and Hub."

**Connect the Information Controller and Hub**

1. Connect the Information Controller's **APC LAN** port to any station port on the Information Controller Hub, using a CAT 5 network jumper cable (provided)

> ⚠ **Note** — Station ports are those with an *x* after the number (e.g., 2x).
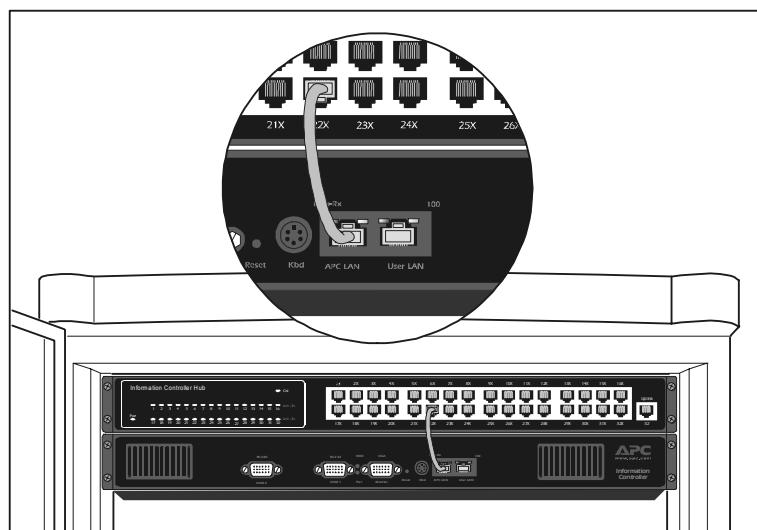
**Connect the Information Controller to your LAN**

1. Connect a port on your LAN to the Information Controller's **User LAN** port.
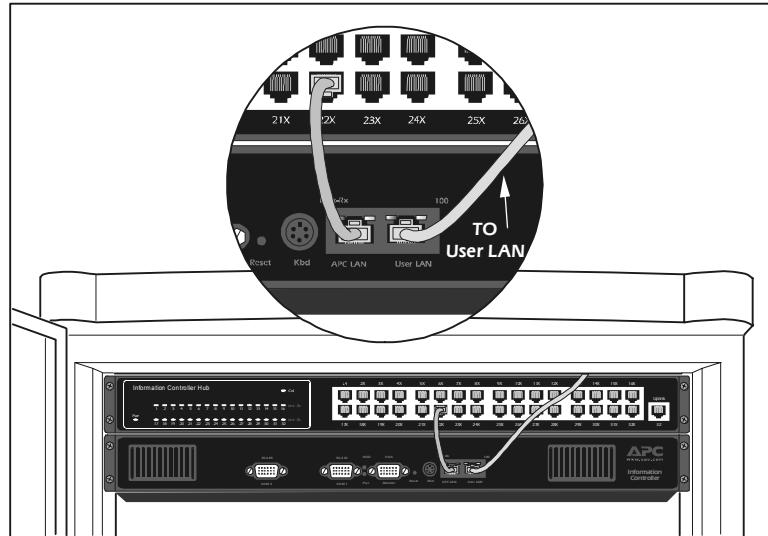


2. Access the APC LAN by following the instructions in "Access the APC LAN" starting on page 80.

   ![Note] If you do not have your network set up yet, you can still access the Information Controller APC LAN and configure initial settings.

**Access the APC LAN**

1. Connect a laptop to one of the station ports on the Information Controller Hub, using a CAT 5 network cable. Your laptop must meet the following requirements:
   – It must be configured to *automatically obtain an IP address* (via DHCP)
   – It must have a 10-BaseT compatible ethernet card
   – It must be running TCP/IP as a network protocol
   – The browser must be Internet Explorer 5.0 or higher
   – Your browser should have Java Script enabled
   – Internet Explorer security cannot be set to high

2. On the proper adaptor, release and renew your laptop's IP address:

   ![Note] The controller will assign your computer one of its private IP addresses.

3. Access the Information Controller's local interface by opening your browser (Internet Explorer 5.0 or higher) and entering the following IP address: `192.168.1.1`

4. Log on to the Information Controller, using the APC default user-name (*apc*, lowercase) and password (*apc*, lowercase).
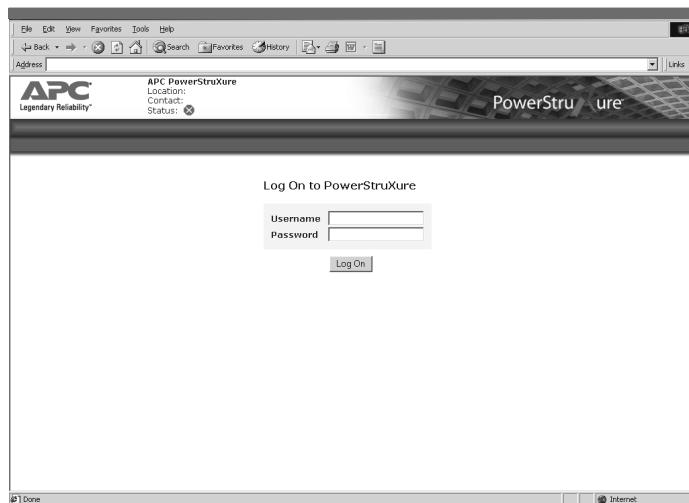


When you first log on to the Information Controller, you will see an initial logon screen. (See the figure below.) To proceed from this screen, you will need the following:

– The System ID—request from the APC Remote Monitoring Service

– Number of enclosures—the total number of enclosures in your PowerStruXure system: XR Frames, Symmetra 3-Phase UPS, PDU with System Bypass, and NetShelter VX (device) enclosures



5. Continue with "Configure initial settings on the Information Controller" starting on page 82.

**Configure initial settings on the Information Controller**

**Note** In order to configure the initial settings of the Information Controller, you will need a list of serial numbers for all APC devices installed in your PowerStruXure system.

1. Ensure that each installed Automatic Transfer Switch, Symmetra 3-Phase UPS, and Environmental Monitoring Unit are listed on the Information Controller Configure screen by checking your list of serial numbers with the list of serial numbers on the Configure screen (see figure below).
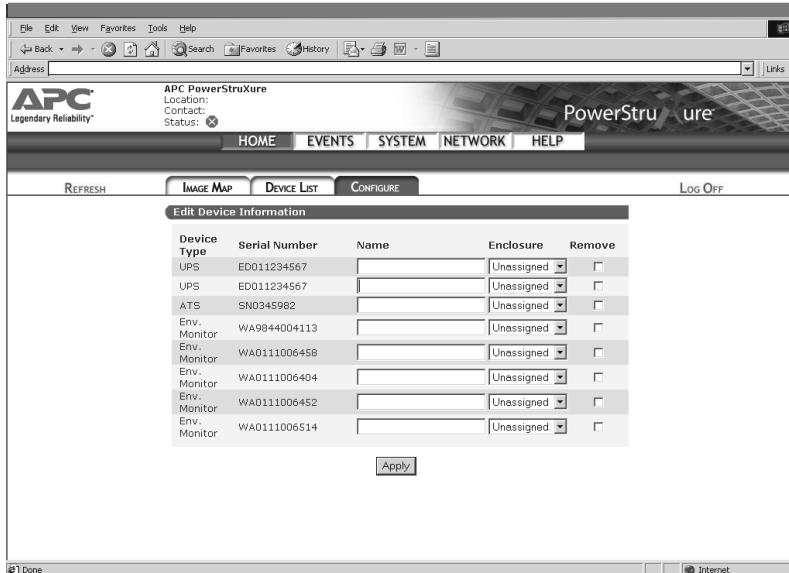


2. On the Configure screen, assign each APC device listed to an enclosure.

3. Click on the **System** button on the Information Controller menu bar and click on the **Inventory** tab. On the Inventory screen, enter all APC device serial numbers that are not detected by the Information Controller (i.e., NetShelter VX enclosures, PDU with System Bypass, Metered Rack-Mount PDUs).
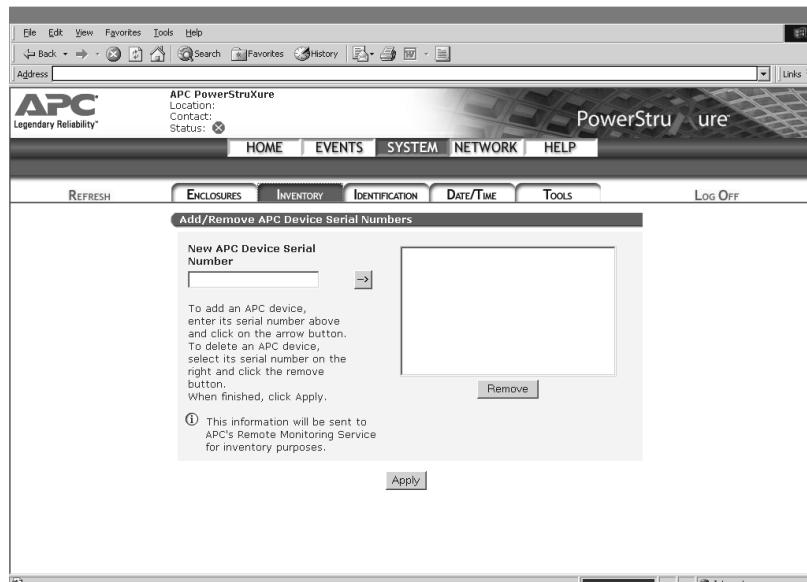
4. Click on the **System** button on the Information Controller menu bar and click on the **Identification** tab. On the Identification screen, click the **Enable RMS** check box to enable RMS, and enter the RMS SMTP mail server address (this address is available from APC RMS).
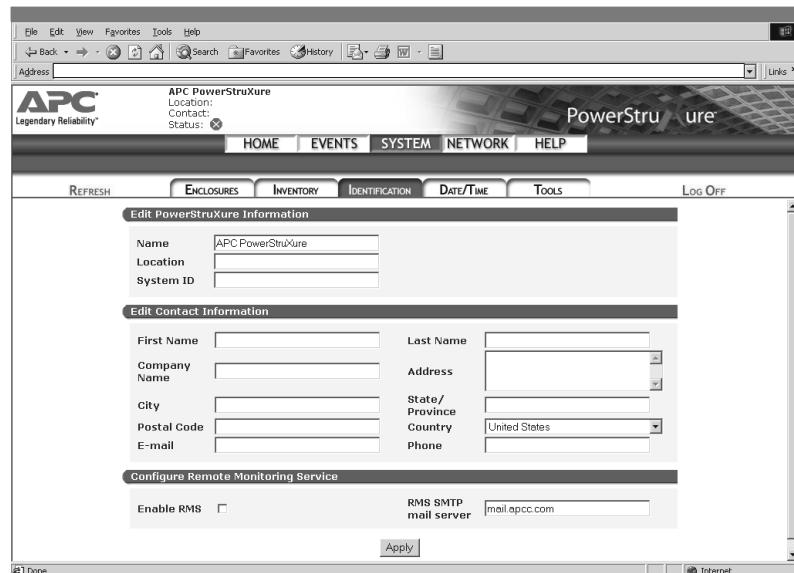


5. Change the username and password from the default by clicking on the **System** button on the menu bar and clicking on the **Users** tab.
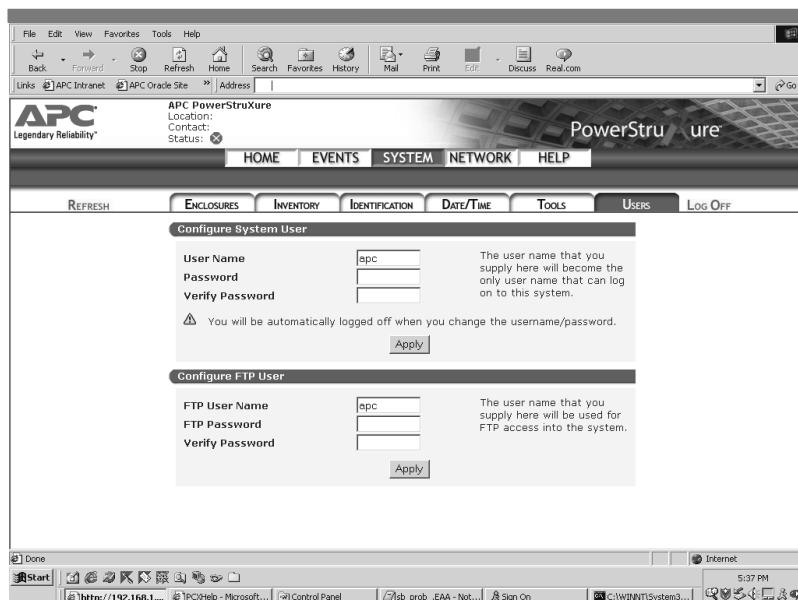


6. Continue with "Assign an IP address to the Information Controller" starting on page 84.

**Assign an IP address to the Information Controller**

Assign an IP address to the Information Controller by following the applicable procedure:

**If you are using DHCP on your user LAN...** Your IT department should create a permanent DHCP lease for the IP address assigned to the Information Controller. You'll need this IP address to access the Information Controller from your User LAN.

1. Log off the Information Controller by clicking the **Log Off** text at right on the tool bar.

2. Disconnect your laptop from the APC LAN port.

3. Continue with "Verify the address assignment" starting on page 85.

**If you are not using DHCP on your user LAN...**

How to set a static IP address for the Information Controller:

1. If you are not already connected to the APC LAN, follow the instructions in "Access the APC LAN" starting on page 80

2. Select the **Network** tab and disable **DHCP** on the **TCP** tab. (See the figure below.)

3. Provide a User LAN IP Address, Subnet Mask, Default Gateway, Host Name, Domain Name, Primary DNS Server, and Secondary DNS Server. (See the figure below.)

> (!) **Note** All the above items should be provided to you by your IT department.
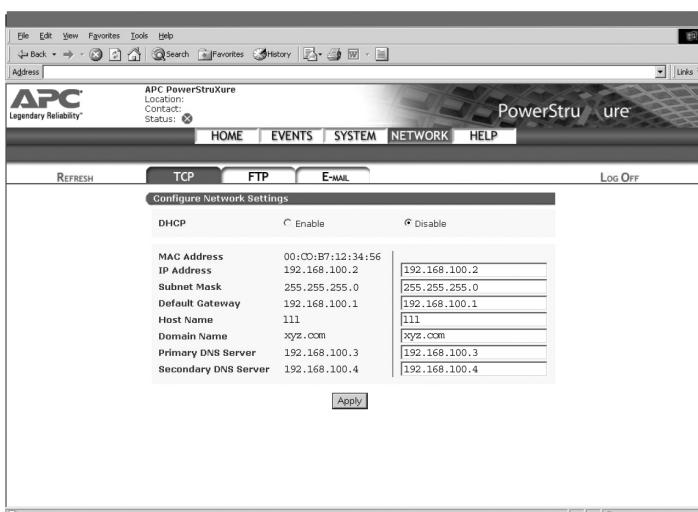


4. Log off the Information Controller by clicking the **Log Off** text at right on the tool bar.

5. Disconnect your laptop from the APC LAN port.

6. Continue with "Verify the address assignment" starting on page 85.

**Verify the address assignment**

1. From a computer on your user LAN, open a browser (Internet Explorer 5.0 or higher) and type in the IP address assigned to the Information Controller in the previous procedure (e.g., `http://192.168.100.2`)..

> **!** **Note**
>
> If you see the screen below, you have configured the Information Controller properly. If you do not see the screen below, check the IP address, verify that the link LED on the User LAN port is illuminated, check your browser version, and check all connections.
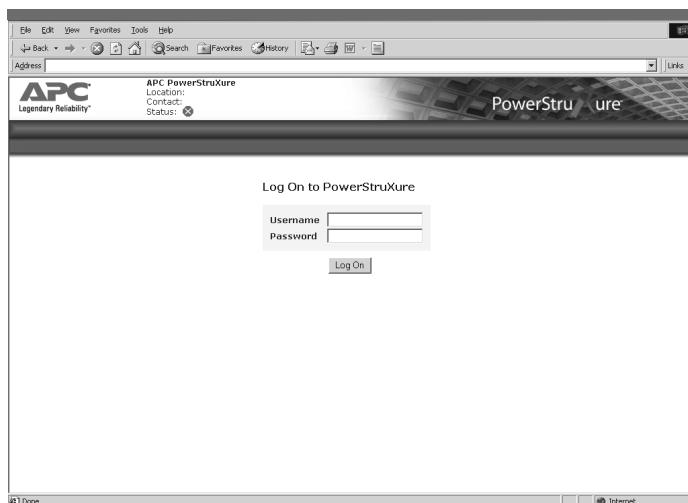
# Configuration

**Metered Rack-Mount PDU . . . . . . . . . . . . . . . . . . . . . .89**

# Metered Rack-Mount PDU

**How to configure through a serial port connection**

1. Connect an available serial port on your computer to the serial port on the front panel of the Metered Rack-Mount PDU, using the supplied configuration cable (p/n 940-0144).

2. Run a terminal emulation software program such as Windows® HyperTerminal.

3. Configure the appropriate serial port with the following settings:
   – 19,200 bps
   – no parity
   – 8 data bits
   – 1 stop bit
   – no flow control.

   **(!) Note** Some terminal emulation software programs require that you disconnect and reconnect in order for the new serial port settings to take effect.

4. Press any key on your computer to bring up the Metered Rack-Mount PDU logon menu.
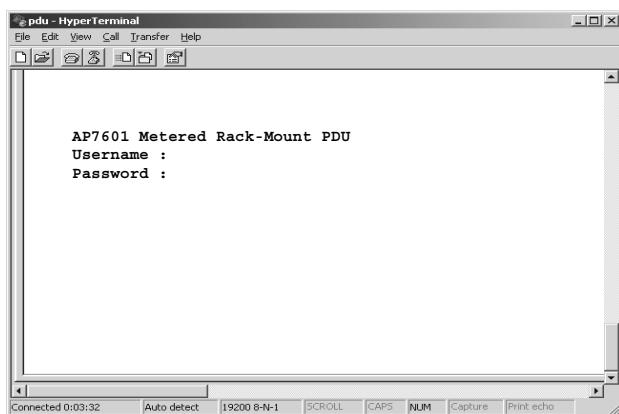


5. Type the default usename and password for the appropriate level of access:
   – **Administrator**
     • Username: type `apc`
     • Password: type `apc` (lowercase)
   – **User**
     • Username: type `apc`
     • Password: press ESC

The Main menu will appear. See "User menus" on page 90 or "Administrator menus" on page 92 for more information on the menus.

**User menus**

**Main menu.** When accessed by a user, the Main menu lists the Status Information, Configuration, Device Data, and Factory menus. Users can access—but not configure—data on these menus. To view a menu, type the associated number and press ENTER.

```
          AP7601 Metered Rack-Mount PDU
          Menu Selections
           1 - Status Information
           2 - Metered Rack-Mount PDU Configuration
           3 - Device Data
           4 - Factory Data
           5 - Logout

          System Messages :
          Menu Selection  >
```
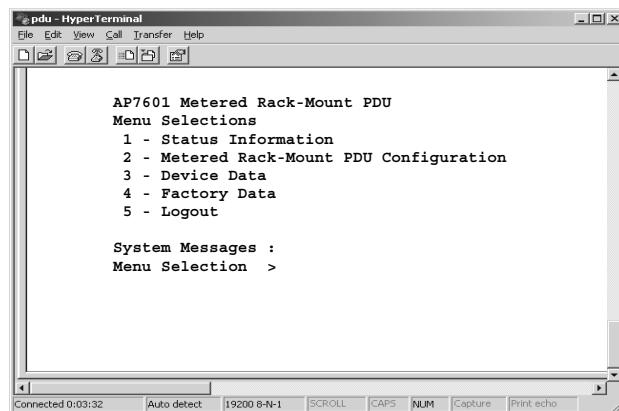
**1: Status Information.** The user Status Information menu displays the present current readings for each phase from the Metered Rack-Mount PDU and whether the Metered Rack-Mount PDU load has reached or exceeded the configured limits for output current.

```
       AP7601 Metered Rack-Mount PDU
       Status Information
                               Current (Amps)          Status
                               --------------          --------
       Output Current L1  -          0.0                 OK
       Output Current L2  -          0.0                 OK
       Output Current L3  -          0.0                 OK

       Menu Selections
       <ESC> - Return to Main Menu
       System Messages :
       Menu Selection  >
```
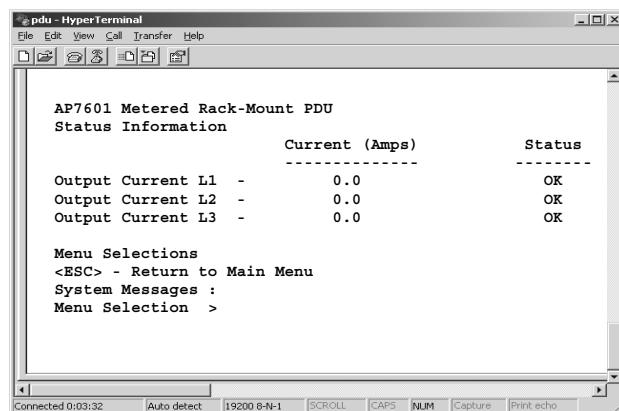
**2: Metered Rack-Mount PDU Configuration.** Users can view the configuration settings for the Metered Rack-Mount PDU. Type 1 and press ENTER to see the warning and alarm data for current. Type 2 and press ENTER to see the audio alarm and digital display settings.

```
       AP7601 Rack-Mount PDU

       Metered Rack-Mount PDU Configuration
          1    - Warning and Alarm Threshold Data
          2    - Audio/Visual Indicator Settings
       <ESC>  - Return to Main Menu

       System Messages :
       Menu Selection  >
```
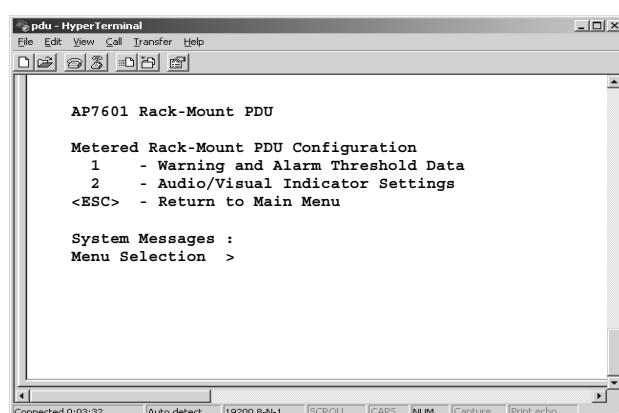
**2-1: *Warning and Alarm Threshold Data.*** Users can view the warning and alarm threshold settings for output current. Each setting is given for all three phases.
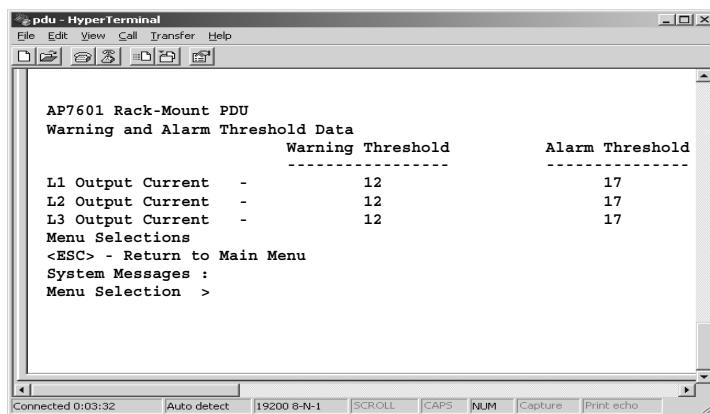
```
AP7601 Rack-Mount PDU
Warning and Alarm Threshold Data
                              Warning Threshold          Alarm Threshold
                              -----------------          ---------------
L1 Output Current    -              12                        17
L2 Output Current    -              12                        17
L3 Output Current    -              12                        17
Menu Selections
<ESC> - Return to Main Menu
System Messages :
Menu Selection  >
```

**2-2: *Audio/Visual Indicator Settings.*** Users can view the present settings for the audio alarm and digital display.
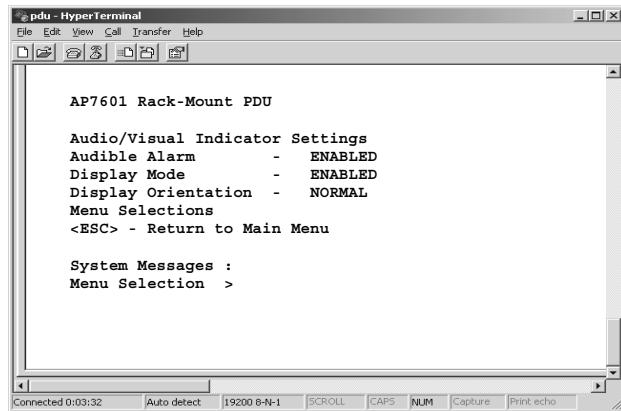
```
AP7601 Rack-Mount PDU

Audio/Visual Indicator Settings
Audible Alarm         -    ENABLED
Display Mode          -    ENABLED
Display Orientation   -    NORMAL
Menu Selections
<ESC> - Return to Main Menu

System Messages :
Menu Selection  >
```

**3: *Device Data.*** Users can view the configured device data about the Metered Rack-Mount PDU. All data is configured by an administrator. The device data helps to keep track of the Metered Rack-Mount PDU.
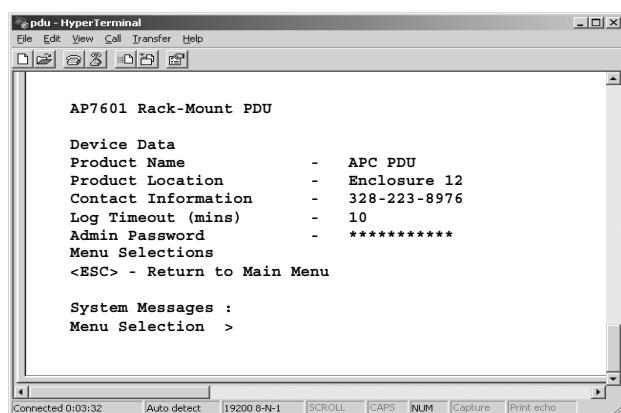
```
AP7601 Rack-Mount PDU

Device Data
Product Name            -    APC PDU
Product Location        -    Enclosure 12
Contact Information     -    328-223-8976
Log Timeout (mins)      -    10
Admin Password          -    ***********
Menu Selections
<ESC> - Return to Main Menu

System Messages :
Menu Selection  >
```

**4: Factory Data.** Users can view the Factory Information, which provides detailed manufacturing data about the Metered Rack-Mount PDU.

```
AP7601 Rack-Mount PDU

Factory Information

Model #          -   AP7601
Serial #         -   23458765
Hardware Rev     -   1.0
Manufacture Date -   11/28/2001
Firmware Rev     -   1.0
Firmware Date    -   10/22/2001
Menu Selections
<ESC> - Return to Main Menu

System Messages :
Menu Selection  >
```
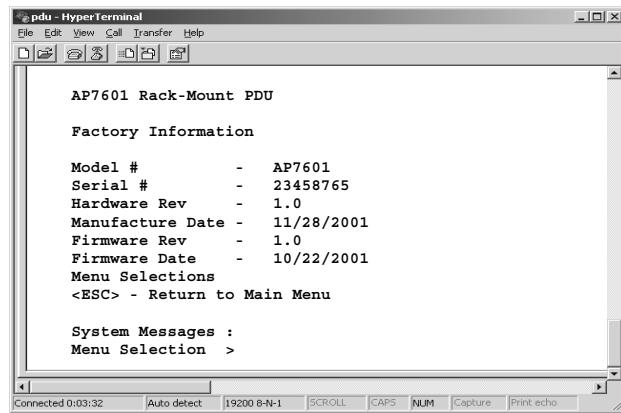
**Administrator menus**

**Main menu.** When accessed by an administrator, the Main menu lists all Metered Rack-Mount PDU menus. Administrators can access all data and configure all items. (Users cannot configure any items on the menus.) To access a menu, type the associated number and press ENTER.

```
AP7601 Metered Rack-Mount PDU

Menu Selections
 1 - Status Information
 2 - Metered Rack-Mount PDU Configuration
 3 - Device Data
 4 - Factory Data
 5 - Logout
 6 - System Management

System Messages :
Menu Selection  >
```
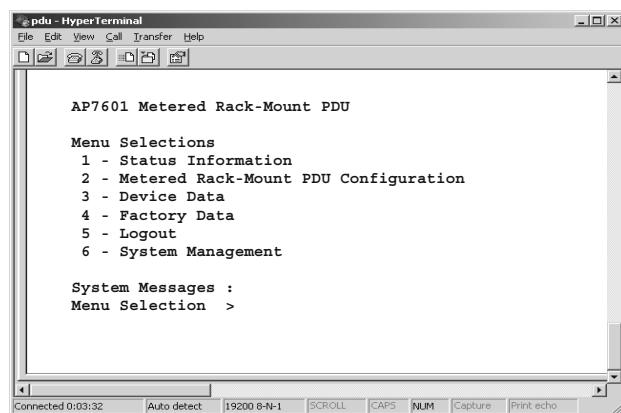
**1: Status Information.** The administrator Status Information menu displays the present current readings for each phase from the Metered Rack-Mount PDU, and whether the Metered Rack-Mount PDU has reached or exceeded the configured limits for output current.

```
AP7601 Metered Rack-Mount PDU

Status Information
                         Current (Amps)          Status
                         --------------          --------
Output Current L1  -          0.0                  OK
Output Current L2  -          0.0                  OK
Output Current L3  -          0.0                  OK

Menu Selections
<ESC> - Return to Main Menu

System Messages :
Menu Selection  >
```
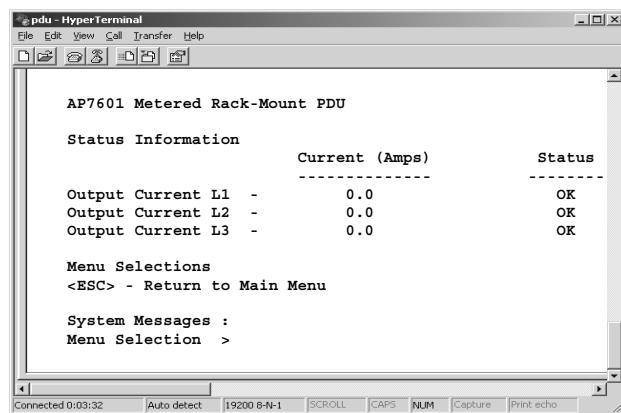
**2: Metered Strip Configuration.** The administrator of the Metered Rack-Mount PDU can configure warning, alarm, and indicator settings. To select a configuration menu, type the number of the desired selection and press ENTER.
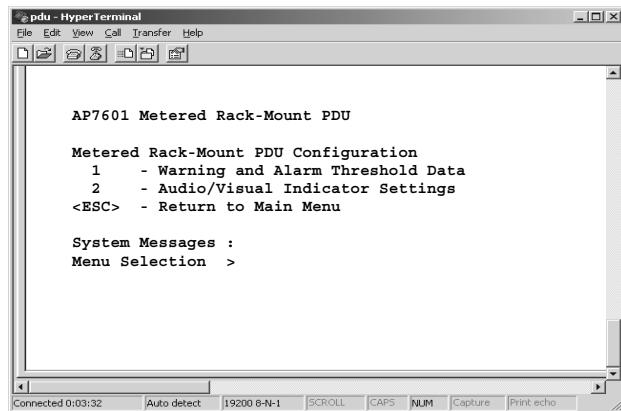


**2-1: *Warning and Alarm Threshold Data.*** The Warning and Alarm Threshold Data menu displays the present settings for output current warnings and alarms, and allows configuration of those settings. To change a setting:

    a.  Type the appropriate number of the setting listed on the menu.

    b.  Press ENTER..

    c.  Type the new amount for the setting you selected.

    d.  Press ENTER.

The change appears immediately in the top alarm and warning data list.
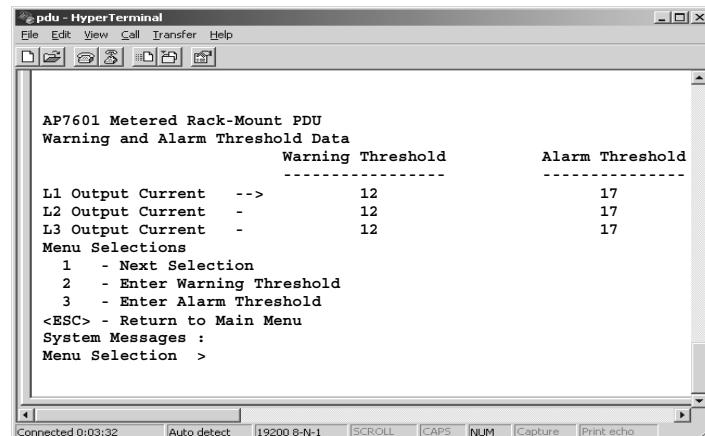
**2-2: *Audio/Visual Indicator Settings.*** The Audio/Visual Indicator menu displays the present settings for the audio alarm and digital display, and allows configuration of those settings. To change a setting:

    a. Type 1 and press ENTER until the arrow cursor reaches the desired setting.

    b. Type 2 and press ENTER to make a change to the setting.

    c. Type the number of the desired change and press ENTER. (The available settings and their associated numbers are listed after the **System Messages** item.)

The change takes place immediately.
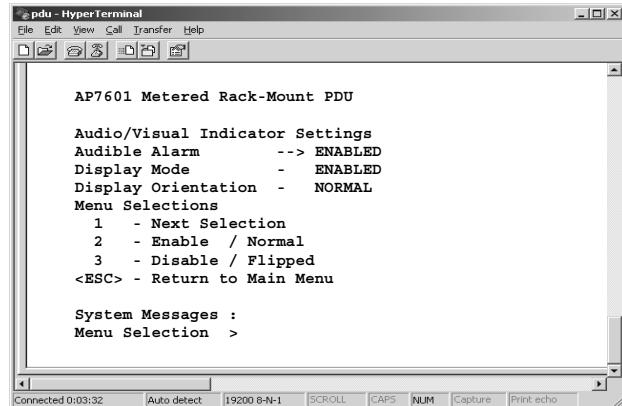


**3: Device Data.** The device data can help you keep track of the Metered Rack-Mount PDU by assigning a unique name for the device, a contact number or name, and the enclosure in which it is housed. To change a device data item:

    a. Type 1 and press ENTER until the arrow cursor reaches the desired item.

    b. Type 2 and press ENTER to make a change to the item.

    c. Type the new value (numbers or letters) and press ENTER.

The change takes place immediately.
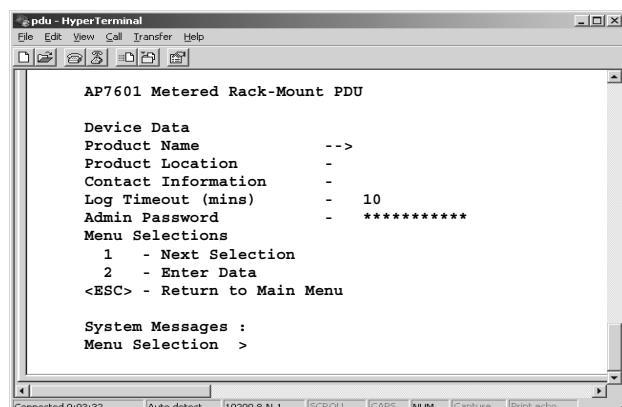
**4: Factory Data.** View detailed manufacturing data about the Metered Rack-Mount PDU.
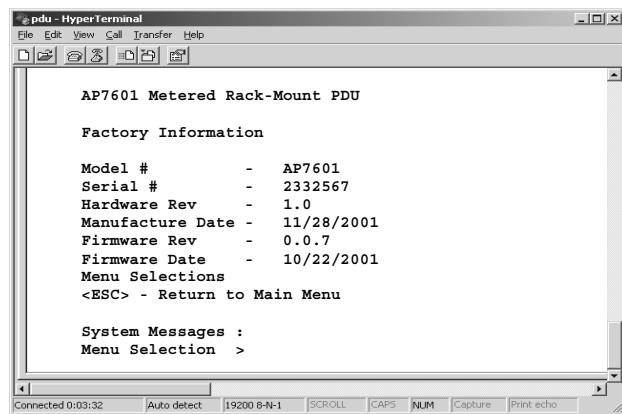
```
pdu - HyperTerminal                                        _ □ ×
File  Edit  View  Call  Transfer  Help


       AP7601 Metered Rack-Mount PDU

       Factory Information

       Model #             -   AP7601
       Serial #            -   2332567
       Hardware Rev        -   1.0
       Manufacture Date -     11/28/2001
       Firmware Rev        -   0.0.7
       Firmware Date       -   10/22/2001
       Menu Selections
       <ESC> - Return to Main Menu

       System Messages :
       Menu Selection  >


Connected 0:03:32    Auto detect   19200 8-N-1   SCROLL   CAPS   NUM   Capture   Print echo
```

**6: System Management.** Select the desired item and press ENTER. Changes take affect immediately. For firmware downloads, follow the instructions on-screen or see "How to download firmware revisions to the Metered Rack-Mount PDU" on page 161.
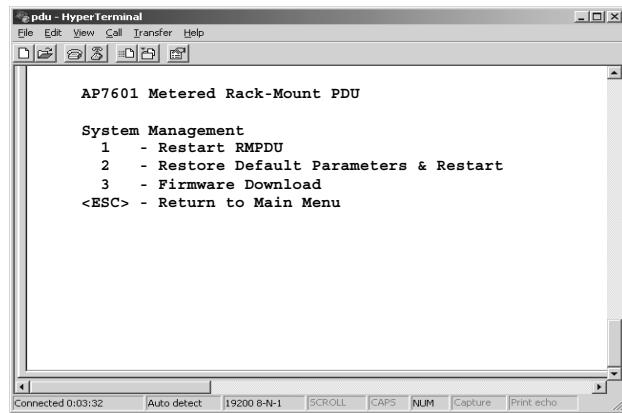
```
pdu - HyperTerminal                                        _ □ ×
File  Edit  View  Call  Transfer  Help


       AP7601 Metered Rack-Mount PDU

       System Management
        1     - Restart RMPDU
        2     - Restore Default Parameters & Restart
        3     - Firmware Download
       <ESC> - Return to Main Menu








Connected 0:03:32    Auto detect   19200 8-N-1   SCROLL   CAPS   NUM   Capture   Print echo
```

# Operation

# System Operation

**How to place the UPS into maintenece bypass operation**

Place the system into maintenance bypass operation when servicing the UPS. When in maintenance bypass operation, power flows directly from the utility to the PDU and out to the load equipment.

1. Command the Symmetra 3-Phase UPS into static bypass through the Symmetra 3-Phase UPS display interface:

   a. Press the ESC key at the Monitoring screen to open the Main menu. This menu allows access to eight submenus:

   ```
   ➤Control      Logging
    Status       Display
    Setup        Diags
    Accessories  Help
   ```

   b. Move the selection arrow to the **Control** item and press the ENTER key.

   c. Move the selection arrow on the Contol menu to the **UPS into Bypass** item and press the ENTER key.

   d. Confirm the selection on the next screen: move the selection arrow to the **Yes, UPS into Bypass** item and press the ENTER key. The BYPASS LED will illuminate and the display will show the following two screens:

   ```
        UPS has been
      commanded to go
       into Bypass...
   ```

   ```
      UPS is in Bypass

       Press any key...
   ```

   **(!) Note** The H3 LED above the Q3 breaker should illuminate, indicating that it is safe to operate the Q3 breaker.

2. Close Q3 breaker on the PDU with System Bypass.

   **(!) Note** The H2 LED above the Q2 breaker should illuminate indicating that it is safe to operate the Q2 breaker.

3. Open the Q2 breaker on the PDU with System Bypass.

4. Turn the System Enable switch on the Symmetra 3-Phase UPS to the off position.

5. Open the DC Disconnect breaker on the Symmetra 3-Phase UPS.

6. Open the Q1 breaker on the PDU with System Bypass.

> **Note**
> After you have finished these steps you are now in maintenance bypass operation and you can service the Symmetra 3-Phase UPS without affecting your connected equipment.

**How to return from maintenance bypass operation**

1. Close the Q1 breaker on the PDU with System Bypass.

2. Close the DC Disconnect breaker on the Symmetra 3-Phase UPS.

3. Turn the System Enable switch on the Symmetra 3-Phase UPS to the On position.

> **Note**
> As soon as you close the DC Disconnect breaker and turn the System Enable switch to the On position, the UPS comes up in static Bypass with the load on.

> **Note**
> The H2 LED above the Q2 breaker should illuminate indicating that it is safe to operate the Q2 breaker.

4. Close the Q2 breaker on the PDU with System Bypass.

> **Note**
> The H3 LED above the Q3 breaker should illuminate, indicating that it is safe to operate the Q3 breaker.

5. Open Q3 breaker on the PDU with System Bypass.

> **Note**
> As soon as you open the Q3 breaker, the UPS will automatically come out of Static Bypass.

**Total power off procedure**

1. Open the DC breaker and turn off the System Enable switch on the Symmetra 3-Phase UPS.
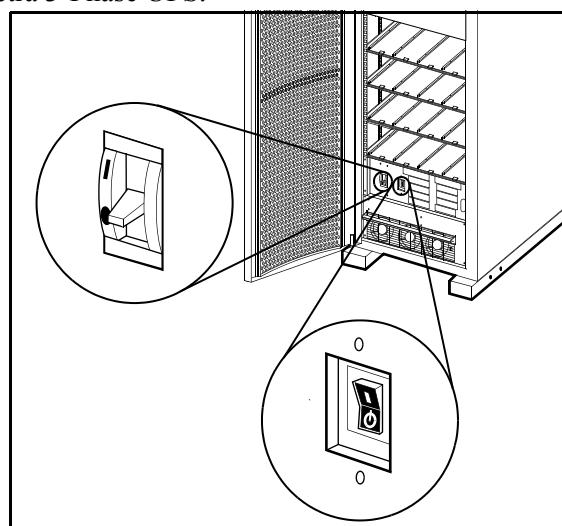
2. Open the Main input circuit breaker on the PDU with System Bypass.
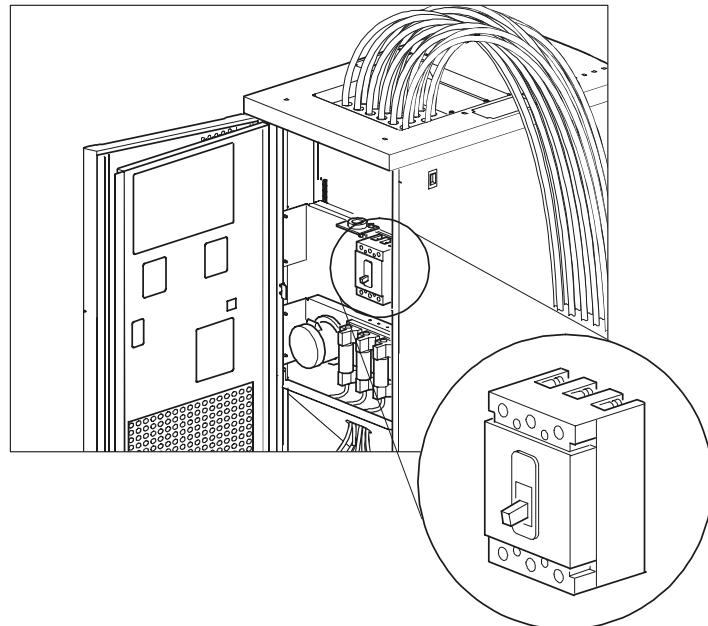


3. Open the DC Disconnect breaker of each XR Battery Cabinet.

4. Disconnect the batteries in the Symmetra 3-Phase UPS by pulling them out approximately one inch (25.4 mm) from their normal position.
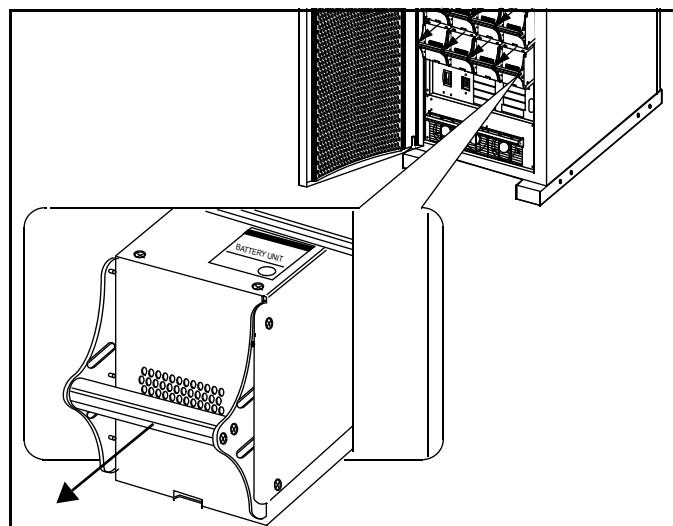


5. Set utility power to the Off or Locked Out position.
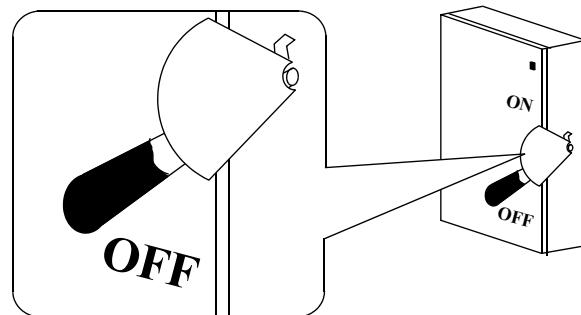
# PDU with System Bypass

**Display interface**

You can use the display interface of the PDU with System Bypass to configure settings, set alarm thresholds, and provide audible and visual alarms.



Four LEDs indicate the operational status of the PDU with System Bypass.

Liquid crystal display (LCD).

Select and open menu items, access information, change system parameters, and launch context-sensitive help, using the five navigation keys.
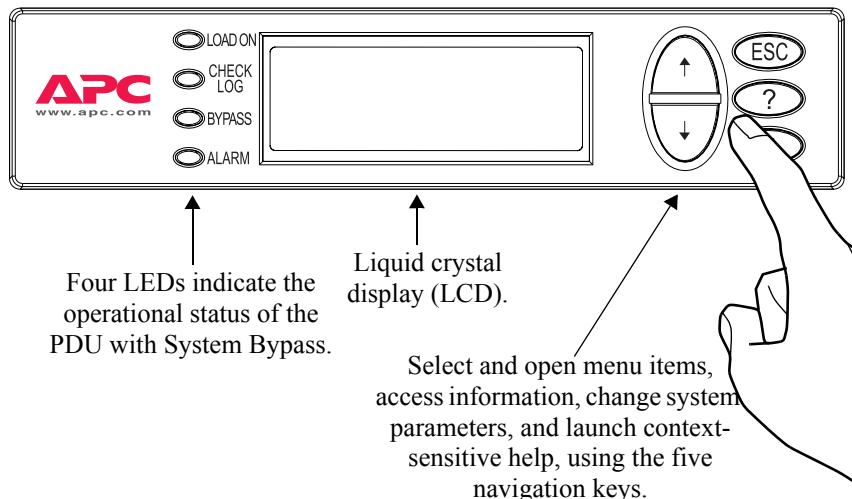
**LEDs**

| LED | Color | Status |
|-----|-------|--------|
| LOAD ON | Green | The PDU with System Bypass is supplying conditioned power to the load equipment. |
| CHECK LOG | Yellow | At least one new alarm condition has been detected. |
| BYPASS | Yellow | Power to the load is being supplied directly by the mains power source. The UPS has been removed from the circuit for maintenance or replacement. Bypass breakers on the PDU with System Bypass function as input breakers to protect the load equipment. |
| ALARM | Red | An alarm condition exists. |

**Top-level status screens**

After displaying a brief start-up screen after system start-up, the display interface scrolls automatically and continuously through four screen of basic status information.

```
Volts In    Volts Out
L1-2: 112   L1: 112
L2-3: 114   L2: 112
L3-1: 116   L3: 112
```
**Status Screen 1**

```
Load Current
L1: 000    Neut: 000
L2: 001
L3: 000    Gnd: 00.0
```
**Status Screen 2**

```
Total Output Loading
KW:  000.0  PF: 0.00
KVA: 000.0  %LD: 000
Freq: 60.0
```
**Status Screen 3**

```
Active Alarm: 01of11
Input Transformer
Temperature Too High
```
**Status Screen 4**
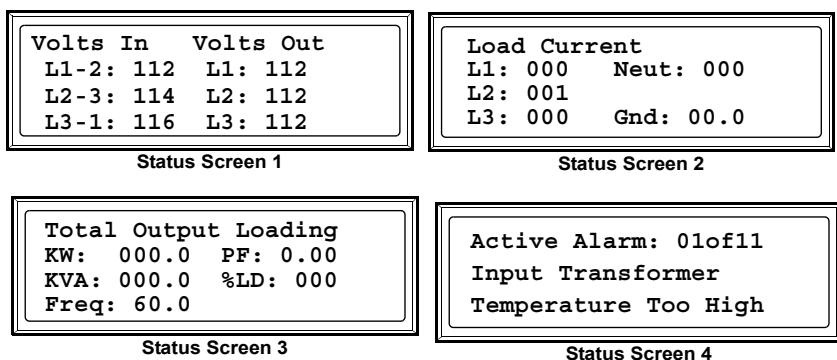
Press the UP and DOWN 🔽 🔼 keys to interrupt the automatic scrolling to view a specific status screen.

**Top-level Menu screen**

On any top-level status screen, press the ENTER ⊕ key to open the top-level Menu screen.

```
 ➡ Load-Meter   Alarms
    Volt-Meter   EPO
    Contacts     Config
    Breakers     Help
```
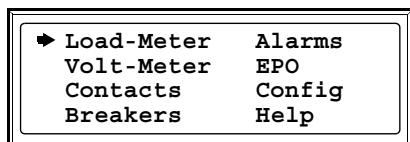
| Option | Tasks |
|---|---|
| Load-Meter | Monitor the load that the PDU with System Bypass is supporting, by phase or in summary. |
| Volt-Meter | View the input and output voltage data for the PDU with System Bypass. |
| Contacts | Configure settings and monitor the present status for any contacts set up on the PDU with System Bypass monitoring unit. |
| Alarms & Logging | Configure alarm settings and view recent and active alarms. |
| Config | • Configure setup preferences for your display interface.<br>• Configure settings for the PDU with System Bypass and for your network.<br>• Set the characteristics of the electrical service that provides input to the PDU. |
| Help | Obtain help about selected topics and procedures. |

**Note**

If the display interface is inactive for the time specified as the **Time-out** setting of the System **Password** option on the **Config** screen, the interface reverts to the initial basic monitoring screens. See "System Password" on page 112.

To open any screen, press the UP and DOWN ⬇ ⬆ arrow keys until the selector arrow rests next to your desired selection. Press the ENTER ⊕ key to view the selected screen.

```
 ➡ Load-Meter   Alarms          Contact In: 02of04
    Volt-Meter   EPO             Name: User Switch #2
    Contacts     Config          Normal:➡Open
    Breakers     Help     ↑      Status: Open
```

Top-level Menu screen          Contacts screen
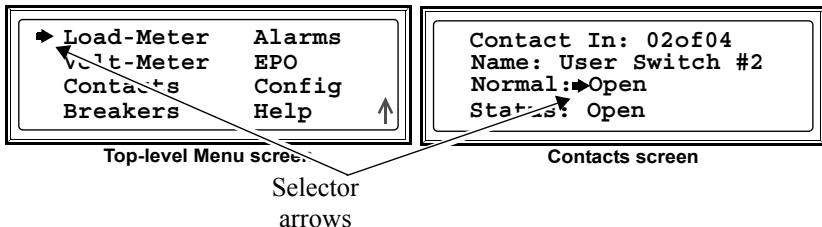
Selector
arrows

When configuring settings, press the UP and DOWN ⬇ ⬆ keys until the selector arrow rests next to the setting you want to change and press the ENTER ⊕ key. If the setting is a list of choices, an input arrow will appear next to the setting. Press the UP and DOWN ⬇ ⬆ keys until your desired change is listed. Press the ENTER ⊕ key to and change to the setting.

```
    Contact In: 02of04
    Name: User Switch #2
    Normal:↕Open
    Status: Open
```

Contacts screen

Input arrow

On the Config screen and the Breaker screen, continue arrows indicate that there are additional screens to view in the category. Press the UP and/or DOWN ⍌ ⍓ keys to view the additional screens.

```
  System/Network
  Input Configuration
  Panel Configuration
  Manufacturer Data      ↓
```

**Config screen**

```
Breaker:↕ 02of05
Name: 02 Breaker
Normal: Closed
Status: Open
```

**Breaker screen**

Continue arrows

**Screen map: PDU with
System Bypass**

```
                              ╭─────────╮
                              │  START  │
                              ╰─────────╯
                                   │
                                   ▼
                    ┌──────────────────────────┐
                    │ Volts In     Volts Out    │   Enter
                    │ L1-2: 112    L1: 112      │ ─────────
                    │ L2-3: 114    L2: 112      │   Esc
                    │ L3-1: 116    L3: 112      │
                    └──────────────────────────┘
                                   │
                                   ▼
                    ┌──────────────────────────┐
                    │ Load Current             │   Enter
                    │ L1: 000     Neut: 000    │ ─────────
                    │ L2: 001                  │   Esc
                    │ L3: 000     Gnd: 00.0    │
                    └──────────────────────────┘
                                   │
                                   ▼
                    ┌──────────────────────────┐
                    │ Total Output Loading     │   Enter
                    │ KW:  000.0  PF: 0.00     │ ─────────
                    │ KVA: 000.0  %LD: 000     │   Esc
                    │ Freq: 60.0               │
                    └──────────────────────────┘
                                   │
                                   ▼
                    ┌──────────────────────────┐
                    │ Active Alarm: 01of11     │   Enter
                    │ Input Transformer        │ ─────────
                    │ Temperature Too High     │   Esc
                    └──────────────────────────┘

                    ┌──────────────────────────┐
                    │ ➜ Load-Meter    Alarms   │
                    │   Volt-Meter    EPO      │
                    │   Contacts      Config   │
                    │   Breakers      Help     │
                    └──────────────────────────┘
```

```
  Load-Meter        Esc           Volt-Meter       Esc            Contacts          Esc
                                                                [Future Enhancement]

┌────────────────────┐        ┌────────────────────┐      ┌──────────────────────────┐
│ ➜Total Load by Phase│       │ ➜ Output Voltage   │      │ Contact In: 01of04       │
│  Total Load Summary │       │   Input Voltage    │      │ Name: User Switch #1     │
│  Power Factor       │       └────────────────────┘      │ Normal: Open             │
└────────────────────┘                                    │ Status: Open             │
                                                          └──────────────────────────┘

Total Load  ┌──────────────────┐    Output   ┌──────────────────────┐      ┌──────────────────────────┐
by Phase    │   KVA   Iout  %LD│    Voltage  │ Output Voltage       │ Esc  │ Contact In: 02of04       │ Esc
            │ L1:00.0 000  000 │Esc          │ L1-2: 001   L1: 001  │      │ Name: User Switch #2     │
            │ L2:00.0 001  000 │             │ L2-3: 001   L2: 001  │      │ Normal: Open             │
            │ L3:00.0 000  000 │             │ L3-1: 001   L3: 001  │      │ Status: Open             │
            └──────────────────┘             └──────────────────────┘      └──────────────────────────┘

Total Load  ┌──────────────────┐    Input    ┌──────────────────────┐      ┌──────────────────────────┐
Summary     │ Total Output Loading│Esc Voltage│ Input Voltage        │ Esc  │ Contact In: 03of04       │ Esc
            │ KW:  000.0  PF: 0.00│            │ L1-2: 001            │      │ Name: User Switch #3     │
            │ KVA: 000.0  %LD: 000│            │ L2-3: 001            │      │ Normal: Open             │
            │ Freq: 60.0          │            │ L3-1: 001            │      │ Status: Open             │
            └──────────────────┘             └──────────────────────┘      └──────────────────────────┘

Power       ┌──────────────────┐                                           ┌──────────────────────────┐
Factor      │   KVA   KW    PF │                                           │ Contact In: 04of04       │ Esc
            │ L1:00.0 00.0 0.00│Esc                                        │ Name: User Switch #4     │
            │ L2:00.0 00.0 0.00│                                           │ Normal: Open             │
            │ L3:00.0 00.0 0.00│                                           │ Status: Open             │
            └──────────────────┘                                           └──────────────────────────┘
```

*The Main Menu is continued on the next page.* [Down]

[Up]

```
        ┌─────────────────────────┐
        │ Load-Meter    Alarms    │
        │ Volt-Meter    EPO       │
        │ Contacts      Config    │
        │➤ Breakers     Help      │
        └─────────────────────────┘
```

*Continuation of Main Menu*

**Breakers**                    Esc

**Alarms**          Esc

**EPO**          Esc

```
┌─────────────────────────┐
│ Breaker:  01of05        │
│ Name: Q1 Breaker        │
│ Normal: Closed          │
│ Status: Open            │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│➤ View Active Alarms     │
│  Alarm Log              │
│  Alarm Setup            │
│  Alarm Beeper           │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│ EPO Monitor             │
│ State:  Disarmed        │
│ Switch: Disengaged      │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│ Breaker:  02of05        │
│ Name: Q2 Breaker        │   Esc
│ Normal: Closed          │
│ Status: Open            │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│ Breaker:  03of05        │
│ Name: Q3 Breaker        │   Esc
│ Normal: Closed          │
│ Status: Open            │
└─────────────────────────┘
```

[Up]

[Down]

```
┌─────────────────────────┐
│ Breaker:  04of05        │
│ Name: Q4 Breaker        │   Esc
│ Normal: Closed          │
│ Status: Open            │
└─────────────────────────┘
```

```
┌─────────────────────────┐
│ Breaker:  05of05        │
│ Name: Q5 Breaker        │   Esc
│ Normal: Closed          │
│ Status: Open            │
└─────────────────────────┘
```

View Active
Alarms

```
┌─────────────────────────┐
│ Active Alarm: 01of11    │
│ Input Transformer       │   Esc
│ Temperature Too High    │
└─────────────────────────┘
```

Alarm
Log

```
┌─────────────────────────┐
│➤New Logged Alarms       │
│ Entire Alarm Log        │   Esc
│ All Possible Alarms     │
│ Clear Alarm Log         │
└─────────────────────────┘
```

Alarm
Setup

```
┌─────────────────────────┐
│➤Loading Limits          │
│ Voltage Limits          │   Esc
│ Other Limits            │
│ Global Alarm Config     │
└─────────────────────────┘
```

Alarm
Beeper

```
┌─────────────────────────┐
│ Alarm Beeper(If Active):│
│  --Silence Alarms--     │   Esc
│  All Alarms             │
│  Active Alarm           │
└─────────────────────────┘
```

**Config**

```
┌─────────────────────────┐
│➤ System/Network         │
│  Input Configuration    │
│  Panel Configuration    │
│  Manufacturer Data    ↓ │
└─────────────────────────┘
```

Esc

```
┌─────────────────────────┐
│➤ Product Data           │
│  Factory Defaults       │
│  Firmware Update        │
│                       ↑ │
└─────────────────────────┘
```

System/
Networks

```
┌─────────────────────────┐
│➤ System Password        │
│  Time/Date              │   Esc
│  Local Interface        │
│  Network Address        │
└─────────────────────────┘
```

Input
Configuration

```
┌─────────────────────────┐
│➤Service Type: Delta     │
│ Input Voltage: 480V     │   Esc
│ Main Breaker:   200A    │
│ Transformer:    YES     │
└─────────────────────────┘
```

Panel
Configuration

```
┌─────────────────────────┐
│➤ Panel Config (Left)    │
│  Panel Config (Rght)    │   Esc
│  Global Panel Config    │
└─────────────────────────┘
```

Manufacturer
Data

```
┌─────────────────────────┐
│➤ PDU Monitor            │
│  PDU Meter              │   Esc
└─────────────────────────┘
```

Product
Data

```
┌─────────────────────────┐
│➤ Device Name            │
│  Product Location       │   Esc
│  Product Contact        │
└─────────────────────────┘
```

Factory
Defaults

```
┌─────────────────────────┐
│ Set Configuration       │
│ to Factory Defaults?    │   Esc
│➤NO, ABORT               │
│  YES, Set to Defaults   │
└─────────────────────────┘
```

Firmware
Update

```
┌─────────────────────────┐
│➤ PDU Monitor            │
│  PDU Meter              │   Esc
└─────────────────────────┘
```

**Load-Meter screen**

From the **Load-Meter** screen, you can select the following items:

| | |
|---|---|
| **Total Load by Phase** | The load supported by each phase in kVA, in RMS current (**Irms**), and as a percentage of the breaker rating (**%LD**). |
| **Total Load Summary** | For the total load supported: <br> • **kW**: The power provided, in kilowatts <br> • **kVA**: The actual power drawn by the load, in kilovolt-amperes <br> • **Freq**: Frequency <br> • **PF**: The power factor, which affects the power available to the load. <br> • **%LD**: The present load as a percentage of the breaker rating. |
| **Power Factor** | For each phase: <br> • **kVA**: The actual power drawn by the load, in kilovolt-amperes (kVA). <br> • **kW**: The power, in kilowatts provided by the phase. <br> • **PF**: The power factor, which affects the power available to the load. |
| **Branch Ckt Loading** | You can display this status if the option to measure individual currents is installed. <br><br> In the **Branch Ckt Loading** screen, scroll through the list of breakers in the panel to display the following, for each pole associated with a breaker: <br> • **Ckt**: The panel position of the pole (for example 03). <br> • *nn***of***bb***:** The rating in amps (for example 20 A) for each pole associated with breaker number *nn* of the total number of installed breakers *bb* in the panel (for example 01of28). <br> • **Irms**: the measured root mean square (RMS) current. <br> • **%LD**: Present load as a percentage of rated load. <br><br> The following example shows the display for a 3-pole, 20-amp breaker. To configure poles so that they are tied together (i.e., associated with the same breaker), see "Panel Config (Left)" and "Panel Config (Right)" on page 114. |

```
Ckt: 01of28 Irms %LD
01:   20A     16.0 080
03:   20A     10.0 050
05:   20A     20.0 100
```

**Volt-Meter screen**    From the **Volt-Meter** screen, you can select the following items:

**Output Voltage**    Displays each phase-to-phase output voltage (e.g. **L1-2** for phase L1 to phase L2) and each phase-to-neutral output voltage (e.g. **L1** for phase L1 to neutral).

**Input Voltage**    Displays each phase-to-phase input voltage (e.g. **L1-2** for phase L1 to L2), and, if your service transformer is a Wye transformer, each phase-to-neutral input voltage (e.g. **L1** for phase L1 to neutral).

**Contacts screen**    Contact monitoring is a future enhancement that is not available at this time.

**Alarms & Logging screen**

**Alarm Beeper.** Use this option of the **Alarms & Logging** screen to access the following options:

| | |
|---|---|
| **Silence All Alarms** | Turn off the audible alarm for present and future alarms. |
| **Silence Active Alarms** | Turn off the audible alarm for the present alarm condition only. If the condition recurs, the alarm sounds again. |

If the alarm beeper has been deactivated by previously selecting the Silence All Alarms option, the Alarm Beeper screen displays the following option:

| | |
|---|---|
| **Activate Alarm Beeper** | Turns on the audible alarm. |

**View Active Alarms.** Use this option of the **Alarms & Logging** screen to display active alarms (alarms that have not been resolved). Scroll through the list to view each active alarm.

**Alarm Log.** Use this option of the **Alarms & Logging** screen to access the following options:

| | |
|---|---|
| **New Logged Alarms** | Display a description and the date and time of each alarm that occurred since the last time this option was used.<br>• The most recent alarm is displayed initially. To move to the previous alarm, press the DOWN arrow key. To move to the next more recent alarm, press the UP arrow key.<br>• If the log contains no alarms, the screen displays Alarm Log Empty and the system date and time.<br>The date/time format is *mmm-dd yyyy hh:mm:ss.* |
| **Entire Alarm Log** | Display a description and the date and time of each alarm in the alarm log.<br>• The most recent alarm is displayed initially. press the DOWN arrow key. To move to the next more recent alarm, press the UP arrow key.<br>• If the log contains no alarms, the screen displays Alarm Log Empty and the system date and time.<br>The date/time format is *mmm-dd yyyy hh:mm:ss.* |
| **All Possible Alarms** | Display a description of each alarm that can occur. To move through the list, press the UP or DOWN arrow key. For more information on each alarm, see "List of PDU Alarms" on page 111. |
| **Clear Alarm Log** | Delete the contents of the alarm log. This action requires a password. |

**Alarm Setup.** Use this option of the **Alarms & Logging** screen to access the following options:

| | |
|---|---|
| **Loading Limits** | (Password required to modify.) |
| | Configure the following, in amps and as a percentage of full load:<br>• **Out High:** The upper limit for output current<br>• **Out Low:** The lower limit for output current<br>• **Out Neut:** The upper limit for current on the neutral wire for the output phases |
| **Voltage Limits** | (Password required to modify.) |
| | Configure the following, as a percentage under or over the rated voltage.<br>• **Input: The** allowed range for input voltage<br>• **Output**: The allowed range for output voltage |
| **Other Limits** | (Password required to modify.) |
| | Configure these limits:<br>• **Frequency**: The frequency variation, in Hz, that is acceptable for the output current.<br>• **Gnd Current**: The upper limit, in amps, for the current on the earth ground wire.<br>• **Branch Ckt Limits**: Available only if the option to measure individual currents is installed, **Branch Ckt Limits** accesses a scrollable list of the breakers in the panel. For each breaker, the screen displays, in the **Loading** column, the current on each pole as a percentage of the rated current. In the **Load Alarm** column, you can configure the high and low thresholds for the breaker as a percentage of its rated current. For example, if you set 80% as the high threshold for a 3-pole 20-amp breaker, an alarm condition occurs if the current on any of the three poles reaches 16 amps. |
| **Global Alarm Config** | (Password required to view or modify.) |
| | Set all the loading limits or all the voltage limits simultaneously as a percentage of full load:<br>• **Load Limits:** Set the same percentage for the upper limit for output current, the lower limit for output current, and the upper limit for current on the neutral wire for the output phases. (Use the **Loading Limits** option to set these thresholds individually).<br>• **Volt Limits:** Set the same percentage for the high and low thresholds for input and output voltage. (Use the **Voltage Limits** option to set these thresholds individually). |
| | Select **Apply Now** and then **YES** to implement your changes. |

**List of PDU Alarms.** This table lists all alarms that can be generated by the PDU with System Bypass, as displayed by the **All Possible Alarms** option, with numeric variables between the < > characters. Logged alarms will display specific numbers instead.

| Alarm Condition | Explanation | Message When Condition Cleared. |
|---|---|---|
| Input V <L-L>=<Value> Voltage Under Limit | Phase-to-phase input voltage between the two phases indicated has dropped below the configured lower limit. | Input Voltage V <L-L> Back In Range |
| Input V <L-L>=<Value> Voltage Over Limit | Phase-to-phase input voltage between the two phases indicated exceeded the configured upper limit. | |
| Output V <L-N>=<Value> Voltage Under Limit | Phase-to-neutral output voltage for phase <L-N> dropped below the configured limit. | Output Voltage V <L-N> Back In Range |
| Output V <L-N>=<Value> Voltage Over Limit | Phase-to-neutral output voltage for phase <L-N> exceeded the configured limit. | |
| Output I <N>=<Value> Current Over Limit | Current of output phase <N> exceeded the configured limit. | Output Phase <N> Current Within Limit |
| Output Phase L<n> Current Under Limit | Current of output phase<N> dropped below the configured limit. | |
| Output Neutral Current Over Limit | Current on the neutral wire for the output phases exceeded the configured limit. | Output Neutral Current Within Limit |
| Output FDev=<Value> Freq Out of Range | Frequency of the output current is above or below the range that is configured as acceptable. | Output Frequency Back In Range |
| Earth Ground=<Value> Current Over Limit | Current on the earth ground wire exceeded the configured limit. | Earth Ground Current Within Limit |
| BranchBrkr<nn>=<Value> Current Over Limit | Current on one of the poles of branch circuit breaker *nn* exceeded the configured limit. | BranchBrkr<nn> Current Within Limit |
| BranchBrkr<nn>=<Value> Current Under Limit | Current on one of the poles of branch circuit breaker *nn* dropped below the configured limit. | |
| Input Transformer Temperature Too High | The temperature of the PDU with System Bypass transformer exceeded the normal limit. | Input Transformer Temp. Back to Normal |
| Main Circuit Breaker Open | The Main circuit breaker has been tripped. | Main Circuit Breaker Has Been Closed |
| Output Phase L<n> Fuse Blown | The fuse for output phase L*n* has blown. | Output Phase L<n> Fuse Was Replaced. |
| System Wrap-Around Bypass Closed | The bypass breaker has been tripped. | System Returned From Wrap-Around Bypass. |
| Alarm Log Cleared | The alarm log has been deleted. | None (not applicable) |

**Config screen**

**System Password.** Use this option of the **Config** screen to access these options:

| | |
|---|---|
| **Password** | Change the system password required to access protected screens and fields in the display interface. Enter a string of up to eight alphanumeric characters, followed by the underline character (_) to indicate the end of the string. The default password is APC. |
| **Time-out** | Set the time that the display interface waits for user input before it reverts to the initial scrolling of status screens. Select 1, 2, 5, 10 (the default), or 30 minutes; or 1, 2, or 4 hours, or Forever |
| **Invalidate NOW** | Immediately prompts users to re-enter the system password if they are viewing password-protected screens. |

**Input Configuration.** Use this option of the **Config** screen to configure information about the electrical service that provides input to the PDU with System Bypass.

| | |
|---|---|
| **Service Type** | (Requires a password to modify.) The type of transformer at the service entrance for the building. |
| **Input Voltage** | The voltage of the service transformer. |
| **Main Breaker** | The rating, in amps, of the main breaker for the building's electrical service. |
| **Transformer** | Whether this PDU has a transformer (YES or NO). |

**Panel Configuration.** Use this option of the Config screen to access these options:

**Panel Config (Left) Pos**: The pole positions in the left panel, which contains odd-numbered pole positions only.

**Phase**: The phase associated with this position.

**Breaker:** (Requires password to modify.) Two configurable items:

- The breaker rating, in amps: 20A, 30A, 45A, 50A, or 60A.
- The breaker tie indicator: To be able to monitor breakers correctly, you define the number of poles tied to (i.e., associated with) each breaker. Associating poles with specific breakers here enables you to use the screen option "Branch Ckt Loading" on page 107 to scroll, by breaker number, to information about each breaker. Also, the alarms "BranchBrkr<nn>=<Value> Current Over Limit" and "BranchBrkr<nn>=<Value> Current Under Limit" on page 111 occur for a multi-pole breaker when any of its poles are above or below the limit.

To configure the values on this screen:

1. From the first column use the arrow keys to scroll up or down to the breaker and pole position you want to configure.

2. Press the ENTER key to move to the item you want to configure in the third column (the breaker rating or the breaker tie indicator).

3. Scroll again to select the value you want for the breaker rating or the breaker tie indicator. To associate the breaker with the next pole position in the list, choose the + character as the tie indicator immediately following the breaker rating. To indicate that the breaker is not associated with (tied to) the next pole position in the list, choose the ] character as the tie indicator immediately following the breaker rating. When you change the + or ] character that follows the breaker rating in one row, the + or [ character before the breaker rating in the next row also changes to indicate the changed association between the breaker and that pole position.

*Example*: A 1-pole, 30-amp breaker in position 11, and a 2-pole 60-Amp breaker in positions 13 and 15:

```
       Pos Phase Breaker
      ↕11:  L3    [ 30A ]
       13:  L1    [ 60A +
       15:  L2    + 60A ]
```

| | |
|---|---|
| **Panel Config (Right)** | **Pos**: The pole positions in the right panel, which contains even-numbered pole positions only. |
| | **Phase** and **Breaker**. See "Panel Config (Left)." |
| | To scroll the screen and configure values, see "Panel Config (Left)." |
| | *Example*: A 3-pole. 20-Amp breaker in positions 8, 10, and 12. |

```
         Pos Phase Breaker
       ⇕08:  L1    [ 20A +
         10:  L2    + 20A +
         12:  L3    + 20A ]
```

| | |
|---|---|
| **Global Panel Config** | (Requires password to view or modify.) Configures the same number of poles and the same breaker rating for all breakers in both panels simultaneously. For example, if your system uses only 3-pole, 20 amp breakers, choose this option, scroll to the value 3 for **Poles** and 020 for **Amp Rating, and** then select **Apply Now and YES** to implement your changes. |

*Local Interface.* Use this option of the Config screen to access these options.

| | |
|---|---|
| **Contract** | (Requires password to modify.) Sets the screen contrast for the LCD. Select from 1 (high contrast) to 8 (low contrast). |
| **Key Click** | **On** causes an audible click whenever you press a navigation key. **Off** disables the key click. |
| **Beeper Volume** | Select High, Medium, Low, or Off to adjust the loudness of the audible beeper and the key click. |

*Network Interface.* Use this option of the **Config** screen to access these options to customize system and network settings.

| | |
|---|---|
| **IP** | (Requires password to modify.) The System IP address, which the domain name server translates into a domain name. |
| **Mask** | The subnet mask, which selects some of the bits from an internet address to route it to the subnet. |
| **MAC** | The media access control address, a hardware address that uniquely identifies the PDU with System Bypass network node. |

*Time/Date.* Use this option of the **Config** screen to set any component of the system time and date. The date format is *dd mmm yyyy* (for example, 12 Jun 2001)

To modify values on the Time/Date screen, you must enter the system password.

*Manufacturer Data.* Use this option of the **Config** screen to display a scrollable list containing information about hardware products in your PowerStruXure system. For each hardware product, the following data is displayed.

| | |
|---|---|
| **Manufacturer Name** | The company that made the product. |

| | |
|---|---|
| **Product Contact** | The person to notify concerning questions or problems with regard to the product. |
| **Product Location** | The physical location of the product in your data center. |
| **Model Number**, **Serial Number**, **Product Name**, **Hardware Revision**, **Manufacture Date** | Basic information about the product, useful when requesting service or product updates. |

# Symmetra 3-Phase UPS

**Display interface**

The Symmetra 3-Phase UPS display interface is a local interface used to configure functions, monitor the system, set alarm thresholds, and provide audible and visual alarms.



Four LEDs report the operational status of the Symmetra 3-Phase UPS.

Liquid crystal display (LCD).

Select and open menu items, access information, change system parameters, and launch context-sensitive help, using these five navigation keys.
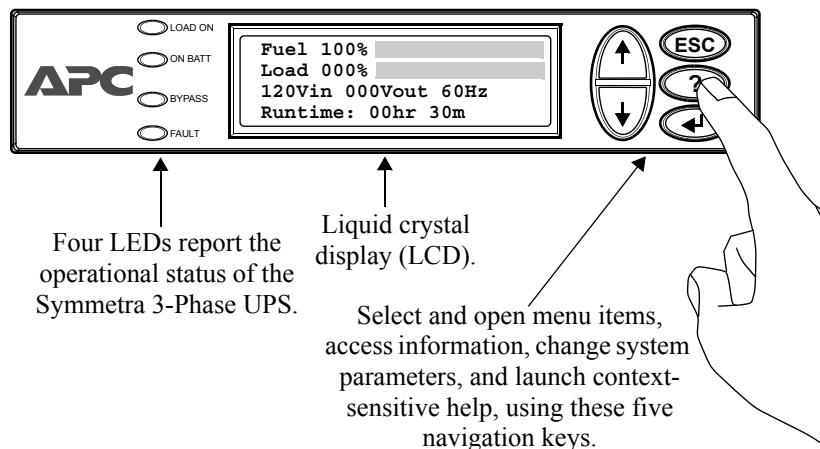
**Display overview**

Press the ESC (ESC) key until you reach the top-level Status screen providing you with basic system status information.

```
Fuel 10%
Load 000%
120Vin 000Vout 60Hz
Runtime: 0hr 0m
```
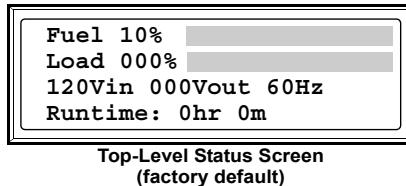
**Top-Level Status Screen
(factory default)**

Press the ENTER key to open the top-level Menu screen. This screen is the launching pad to command, configure, and monitor the Symmetra 3-Phase UPS.

```
↱ Control      Logging
  Status       Display
  Setup        Diags
  Accessories  Help
```

Selector arrow

**Top-Level Menu**

Press the UP and DOWN keys to navigate the selector arrow and view all sub menu screens.

```
Bat Voltage: 128.5V
Bat Capacity 100.0%
Runtime: 01hr  30min
16 Batts, 00Bad
```

**Battery Module Status Screen**

```
Capacity: 12.0kVA
Fault Tolerance: n+2
Total UPS Modules: 03
Bad UPS Modules: 00
```

**Power Module Status Screen**

Scroll arrows indicate additional screens
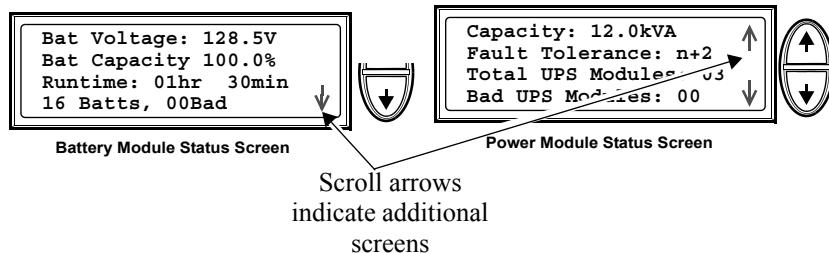
Press the UP and DOWN ⬇ ⬆ keys, and the ENTER ⬅ key to move the Input arrow to select and enter information.

```
Low Batt Dur:   ↕2min
Shutdwn Dly:    20sec
Return Dly:     0sec
Return Bat Cap:  0%
```
**Shutdown Menu**

```
Low Batt Dur: ▾↕10min
Shutdwn Dly:     20sec
Return Dly:       0sec
Return Bat Cap:    0%
```
**Shutdown Menu**

Input arrow
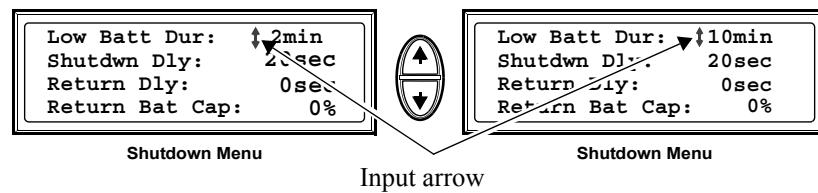
### Control functions

To turn the load on/off:

❶
```
➡ Turn Load On
  Do Self Test
  Simulate Power Fail
  Graceful Reboot
```
**Control Menu**

❷
```
UPS LOAD IS OFF

Press any key...
```
**Load Off Screen**
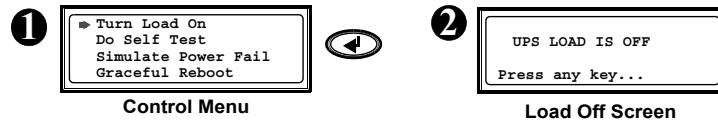
To place the Symmetra 3-Phase UPS in/out of bypass mode:

❶
```
➡ Graceful Turn Off     ↑
➡ Start Runtime Cal
➡ UPS into Bypass
```
**Control Submenu**

❷
```
UPS IS BYPASSED

Press any key...
```
**Bypassed Screen**

⚠ **Warning**
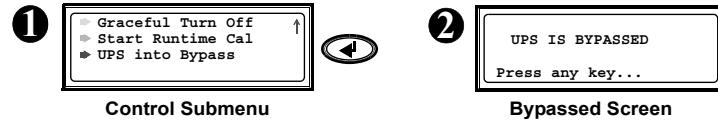
Placing the Symmetra 3-Phase UPS into bypass mode stops backup protection.

### Status functions

Verify general module status

❶
```
➡ Control      Logging
➡ Status       Display
  Setup        Diags
  Accessories  Help
```
**Top-Level Menu**

❷
```
Capacity: 12.0kVA      ↑
Fault Tolerance: n+2
Total UPS Modules: 03
Bad UPS Modules: 00    ↓
```
**Status Screen 6**
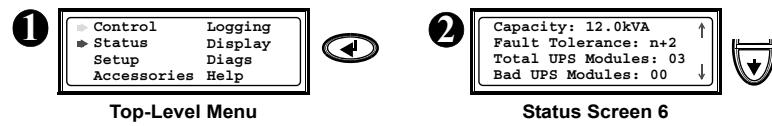
Verify voltage on all phases

❶
```
➡ Control      Logging
➡ Status       Display
  Setup        Diags
  Accessories  Help
```
**Top-Level Menu**

❷
```
Input: 123.3V 59.9Hz
Output: 0.0V
Runtime: 0hr 0min
Load:    A    0%VA    ↓
```
**Status Screen 1**
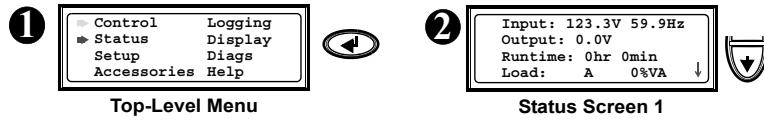
Verify battery voltage/capacity

❶
```
➡ Control      Logging
➡ Status       Display
  Setup        Diags
  Accessories  Help
```
**Top-Level Menu**

❷
```
Bat Voltage: 215       ↑
Bat Capacity: 10.0%
Self Test: None
```
**Status Screen 5**
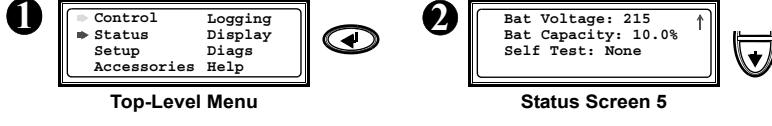
**Set-up functions**

The display interface settings are set to factory defaults. For more information on the settings that you can change, refer to the Symmetra 3-Phase UPS product manual (in PDF) available on the Information Controller **Help** page or on our Web site at: **www.apc.com/support**.

Changing factory default settings

❶
```
  Control    Logging
  Status     Display
  Setup      Diags
  Accessories Help
```
**Top-Level Menu**

❷
```
Settings:      Alarms
  Shutdown     Bypass
  Defaults     Copy
  Output Freq  Other
```
**Settings Menu**
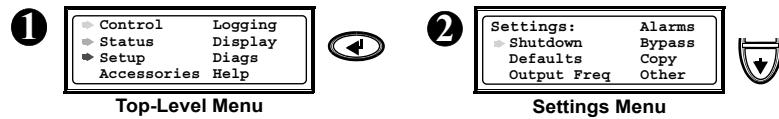
**Basic troubleshooting**

This Troubleshooting section will help you solve most problems using the Symmetra 3-Phase UPS display interface.

**Note** — If the display interface reports a problem, verify that the component in question is correctly installed in the Symmetra 3-Phase UPS. If the problem persists, follow the instructions in "How to Obtain Service" on page 167.

For advanced configuration, refer to the Symmetra 3-Phase UPS Product Manual on the Information Controller **Help** page or on our Web site at: www.apc.com\support.

**General Status troubleshooting**

| Display Message | Meaning | Corrective Action |
|---|---|---|
| Input Freq outside configured range | The input frequency to the Symmetra 3-Phase UPS is outside the configured range. The output frequency will not synchronize with the input frequency. Normal bypass is not available. | **Option 1:** Improve the frequency of the incoming voltage. **Option 2:** Widen the range of the acceptable incoming frequency using the display interface. (Startup-Setup-Output Freq Select.) **Option 3:** Proceed with startup—normal bypass is not available. |
| AC adequate for UPS but not for bypass | The Symmetra 3-Phase UPS will function on-line with the input voltage, but in the event that bypass is required, the input voltage is not adequate to power the load equipment. | **Option 1:** Improve the incoming voltage. **Option 2:** Proceed with startup—normal bypass is not available. |

**Threshold Alarm troubleshooting**

| Display Message | Meaning | Corrective Action |
|---|---|---|
| Redundancy has been lost | The Symmetra 3-Phase UPS no longer detects redundant power modules. Either a power module(s) has failed, or the load has increased. | **Option 1:** If possible, install additional power modules.<br>**Option 2:** Decrease the load<br>**Option 3:** Disable the redundancy alarm by setting redundancy to zero. (Startup-Setup-Alarms-Redundancy-select zero) |
| Runtime is below alarm threshold | The predicted runtime is lower than the user-specified minimum runtime alarm threshold. Either the battery capacity has decreased, or the load has increased. | **Option 1:** Allow the battery modules to recharge.<br>**Option 2:** If possible, increase the number of battery modules.<br>**Option 3:** Decrease the load.<br>**Option 4:** Use the display to decrease the minimum runtime alarm threshold (Startup-Setup-Alarms-Runtime-select). |

**Bypass troubleshooting**

| Display Message | Meaning | Corrective Action |
|---|---|---|
| Bypass is not in range (either freq or voltage) | The frequency and/or voltage is out of acceptable range for bypass. This message occurs when the Symmetra 3-Phase UPS is online, and indicates that the bypass mode may not be available if required. | **Option 1:** Decrease the sensitivity to input frequency. (Startup-Setup-OutputFreq-select).<br>**Option 2:** Correct input voltage to provide acceptable voltage and/or frequency. |

**General Fault troubleshooting**

| Display Message | Meaning | Corrective Action |
|---|---|---|
| Need Bat Replacement | One or more battery units need to be replaced. | Refer to "How to replace a battery unit" on page 158 for more information. |
| The Redundant Intelligence Module is in control | The main intelligence module has failed, and the redundant intelligence module is functioning as the primary intelligence module. | Replace the main intelligence module. See "How to replace an intelligence module" on page 159 for more information. |

**Symmetra 3-Phase UPS
display interface menus**

The following two figures show the display interface menus and the
navigation path to each menu.

```
                        ┌──────────┐
                        │  START   │
                        └──────────┘
                             │
                             ▼
              ┌──────────────────────────┐
              │ Fuel 100% ▓▓▓▓▓▓▓▓▓▓▓▓▓   │
              │ Load 100% ▓▓▓▓▓▓▓▓▓▓▓▓▓··· │
              │ 208Vin 208Vout 60Hz      │
              │ Runtime:  0hr 30min       │
              └──────────────────────────┘
                  │                   ▲
               Any Key              Esc
                  ▼                   │
              ┌──────────────────────────┐
              │ ✦Control      Logging     │
              │  Status       Display     │
              │  Setup        Diag        │
              │  Accessories  Help        │
              └──────────────────────────┘
```

**Control**   Esc

```
┌──────────────────────────┐
│ ✦Turn Load ON/Off         │
│  Do Self Test             │
│  Simulate Power Fail      │
│  Graceful Reboot          │
│  Graceful Turn Off        │
│  Start Runtime Cal        │
│  UPS Into Bypass          │
└──────────────────────────┘
```

Turn Load
ON/OFF
```
┌─────────────────────┐
│ Confirm:            │ Esc
│ Turn Load ON        │
│ ✦NO, ABORT          │
│  YES, Turn Load ON  │
└─────────────────────┘
```

Do Self Test
```
┌─────────────────────┐
│ Confirm:            │ Esc
│ Do Self Test        │
│ ✦NO, ABORT          │
│  YES, Do Self Test  │
└─────────────────────┘
```

Simulate
Power Fail
```
┌─────────────────────┐
│ Confirm:            │ Esc
│ Simulate Power Fail │
│ ✦NO, ABORT          │
│  YES, Simul Pwr Fail│
└─────────────────────┘
```

Graceful
Reboot
```
┌─────────────────────┐
│ Confirm:            │ Esc
│ Graceful Reboot     │
│ ✦NO, ABORT          │
│  YES,Graceful Reboot│
└─────────────────────┘
```

Graceful
Turn Off
```
┌─────────────────────┐
│ Confirm:            │ Esc
│ Graceful Off        │
│ ✦NO, ABORT          │
│  YES, Graceful Off  │
└─────────────────────┘
```

Start/Stop
Runtime Cal
```
┌─────────────────────┐
│ Confirm:            │ Esc
│ Start Runtime Cal   │
│ ✦NO, ABORT          │
│  YES, Do Runtime Cal│
└─────────────────────┘
```

UPS Into/
Out of Bypass
```
┌─────────────────────┐
│ Confirm:            │ Esc
│ UPS Into Bypass     │
│ ✦NO, ABORT          │
│  YES,UPS Into Bypass│
└─────────────────────┘
```

**Status**

```
┌──────────────────────────┐
│    Vin    Vout   Iout     │ Esc
│ 1 209.0  208.0   20A      │
│ 2 208.0  208.0   22A      │
│ 3 209.0  208.0   20A      │
└──────────────────────────┘
```

```
┌──────────────────────────┐
│ % load assuming no        │ Esc
│    redundancy:            │
│       50%                 │
└──────────────────────────┘
```

```
┌──────────────────────────┐
│ % load allowing for       │ Esc
│   n+x redundancy:         │
│       50%                 │
└──────────────────────────┘
```

```
┌──────────────────────────┐
│    Frequencies            │ Esc
│  Input:  60.01Hz          │
│  Output: 60.00Hz          │
└──────────────────────────┘
```

```
┌──────────────────────────┐
│ Batt Voltage:211.5V       │ Esc
│ Batt Capacity:100.0%      │
│ Runtime: 0hr  30min       │
│ 16 Batts, 0 Bad           │
└──────────────────────────┘
```

```
┌──────────────────────────┐
│ Capacity: 40.0 kVA        │ Esc
│ Fault tolerance: n+2      │
│ Total Pwr Modules:05      │
│ Bad Pwr Modules: 0        │
└──────────────────────────┘
```

```
┌──────────────────────────┐
│   Alarm Thresholds        │ Esc
│ Fault Tolerance: n+1      │
│ Runtime: 0hr 15min        │
│ Load: 10.0 kVA            │
└──────────────────────────┘
```

```
┌──────────────────────────┐
│ Self Test: Ok             │ Esc
│ Last Xfer: None           │
│ Status: On Line           │
│ IM: OK    RIM: OK         │
└──────────────────────────┘
```

[Down]  [Up]

**Setup**   Esc

```
┌──────────────────────────┐
│ Settings:    Alarms       │
│ ✦Shutdown    Bypass       │
│  Defaults    Copy         │
│  Output Feq  Other        │
└──────────────────────────┘
```

Shutdown
```
┌──────────────────────────┐
│ ✦Low Batt Dur:  2min      │ Esc
│  Shutdown Dly: 20sec      │
│  Return Dly:    0sec      │
│  Return Batt Cap:15%      │
└──────────────────────────┘
```

Defaults
```
┌──────────────────────────┐
│ Set all UPS settings      │ Esc
│ to Factory Defaults?      │
│ ✦NO, ABORT                │
│  YES,Set to Defaults      │
└──────────────────────────┘
```

Output
Freq
```
┌──────────────────────────┐
│ ✦Output Freq Range:       │ Esc
│   60Hz + 0.1Hz            │
└──────────────────────────┘
```

Alarms
```
┌──────────────────────────┐
│  Alarm Thresholds         │ Esc
│ ✦Redundancy: 1            │
│  Load:    10.0kVA         │
│  Runtime:    0hr 15m      │
└──────────────────────────┘
```

Bypass
```
┌──────────────────────────┐
│ If UPS fails, and         │ Esc
│ line freq or voltage      │
│ is out of normal          │
│ range:✦Go To Bypass       │
└──────────────────────────┘
```

Copy
```
┌──────────────────────────┐
│  Copy UPS Settings        │ Esc
│ ✦Configuration 1          │
│  From UPS to Display      │
│  From Display to UPS      │
└──────────────────────────┘
```

Other
```
┌──────────────────────────┐
│ ✦Self Test: 14 days       │ Esc
│  UPS ID: UPS_IDEN         │
│  VoutReporting: AUTO      │
│  Output: 208V             │
│  BatFrAmpHour:1000        │
└──────────────────────────┘
```

```
START
```

```
Fuel 100% |||||||||||||||||||||
Load 100% |||||||||||||||||||||
208Vin 208Vout 60Hz
Runtime:  0hr 30min
```

Any Key          Esc

```
➤Control      Logging
 Status       Display
 Setup        Diag
 Accessories  Help
```

**Accessories**          Esc

```
        Accessories

➤ MeasureUPS
  Network Card
```

Measure UPS

```
      MeasureUPS
Probe 1➤Stat  Setup
Probe 2 Stat  Setup
Zones   Status
```
Esc

Network Card

```
   Network Card
➤Network Setup
 View Network Setup
```
Esc

**Logging**          Esc

```
➤View Log  Clear Log
 View Statistics
 Configure Logging
 List Event Groups
```

View Log

```
7-Aug 01:23:34 #64
Zone 4 OK
Probe 1 Temp OK
➤ Comm Established
```
Esc

View Statistics

```
1 Transfers->Bat
0 Low Bats
3 Faults
0Hr 0Min On Bat
```
Esc

Configure Logging

```
➤ Power Events: On
  UPS Control: On
  UPS Faults: On
  User Activity: On
  Measure UPS: On
```
Esc

List Event Groups

```
➤ Power Events
  UPS Control Events
  User Activities
  UPS Fault Events
  Measure UPS Events
```
Esc

Clear Event Log

```
Confirm:
➤Clear Event Log
 NO, ABORT
 YES, Clear Log
```
Esc

**Display**          Esc

```
➤Date/Time    Beeper
 Password     Contrast
 Information  Config
```

Date/Time

```
➤Date:   Aug 7 2001
 Time:   15: 30
```
Esc

Password

```
➤Password:»********
 ('_'= end)
 Timeout: 8min
 Invalidate NOW
```
Esc

Information

```
Model# APC9999
S/N: A94063038681
Manuf Date: 11/18/94
Revs:HW=C3   FW=A3a
```

Beeper

```
------- Beep -------
➤At UPS: PwrFail+30s
 At Disp: LowBatt
 Vol:»Low Click: On
```

Contrast

```
➤Contrast:2
```
Esc

Config

```
»Fuel 100% :;:;:;:;:
»Load 100% :;:;:;:;:
D8Vin 230Vout 60Hz
»Runtime: 002hr 20min
```
Esc

**Diag**          Esc

```
➤Fault & Diagnostics
 Frame Status
 Ext Device Status
 Comm Bus Status
```

Fault & Diagnostics

```
An Installed UPS
Module has failed

More
```
Esc

Frame Status

```
Main Frame of 5
Status:14 of 16 bats
Sub-Systems
Raw Status Data
```
Esc

Ext Device Status

```
Maintenance Bypass

➤Battery Breaker Box^

Ext. Iso Transformer^
```
Esc

Comm Bus Status

```
Bus,  Int    Ext
 MIM: XXXXXX  XXXXXX
 RIM: XXXXXX  XXXXXX
 MIM<->RIM: XXXXXX
```
Esc

# 3-Phase Automatic Transfer Switch

## Front panel



| No. | Item | Description/Function |
|---|---|---|
| ❶ | Reset switch | Resets the Network Management Card to its default settings. This switch does not affect the settings of the Automatic Transfer Switch. |
| ❷ | Ethernet Port | Connects the Automatic Transfer Switch to the Information Controller Hub, using an APC network cable (provided). |
| ❸ | Rx-Link LED | Indicates whether there is activity on the network. |
| ❹ | Status LED | Indicates whether the Network Management Card is powered on. |
| ❺ | Preference Selection button | Sets which power source will be the preferred source to supply power to the load equipment. In normal operation, if both sources are available, the Automatic Transfer Switch will use the preferred source. Press the Preference Selection button to change the preferred source. |
| ❻ | Preference A and B LEDs | Indicate which of the two sources (if any) is selected as the user's preferred source. Both LEDs off means that neither source is preferred. |
| ❼ | Source A and B LEDs | Provide information about the condition of the input voltages from both sources. If a source is considered OK, the corresponding indicator will light. A source is OK if the RMS input voltage on all three phases and the measured frequency are within the selected tolerance ranges. In a normal operating condition (full source redundancy), both LEDs are illuminated. |
| ❽ | Connector LEDs | Indicates which source is being used for the output. Only one arrow will be lit at any time. The combination of Source LEDs, Connector LEDs, and Output LEDs provide a graphical view of the power flow though the Automatic Transfer Switch. |
| ❾ | Output indicator | Shows that voltage is truly available at the output for the Automatic Transfer Switch. |
| ❿ | Configuration port | The local connection for accessing all the setup, status, maintenance and diagnostic information for the Automatic Transfer Switch. |

# Metered Rack-Mount PDU

## Display interface



| | |
|---|---|
| ❶ | Control button<br>• press to change the phase of the current displayed on the digital display<br>• press and hold for five seconds to view the orientation; hold for an additional five seconds to change the orientation<br>• press to silence an alarm |
| ❷ | Digital display†<br>• shows the current for the phase corresponding to the Phase Indicator LED that is illuminated<br>• cycles through all three phases in 3-second intervals |
| ❸ | Serial port<br>• access internal menus by connecting this port (RJ-11 modular port) to a serial port on your computer, using the supplied serial cable (p/n 940-0144) |
| ❹ | Phase indicator LEDs<br>• indicates the phase corresponding to the current listed in the digital display<br>• indicates normal (green), warning (yellow) or alarm (red) condition |
| ❺ | Status LED<br>• reserved for future use |
| ❻ | Ethernet port<br>• reserved for future use |
| ❼ | Link LED<br>• reserved for future use |

†Each Metered Rack-Mount PDU is equipped with a sensor that measures the current being used by the Metered Rack-Mount PDU and devices connected to it. The value displayed is the aggregate current of an individual phase. This value is used to generate alarms that you define. For information on configuring alarms, see "2-1: Warning and Alarm Threshold Data" on page 93.

**Alarm conditions**

The warning and alarm limits are configurable through the internal menus through a serial port connection. For instructions on accessing the internal menus, see "How to configure through a serial port connection" on page 89. The following table describes warning and alarm conditions.

| Behaviors During Alarm Condition | | |
|---|---|---|
| **Phase Indicator LED** | **Digital Display** | **Control Button** |
| Yellow: warning<br>Red: alarm | Shows the current for the phase at or above the warning or alarm limit. | • Causes the digital display to show the current reading for the next phase<br>• After 30 seconds of disuse, the display will return to the phase (or cycle among phases) at or above the warning or alarm limit. |

Do not exceed the maximum voltage and current ratings listed on the rear panel of the Metered Rack-Mount PDU.

*Warning*

# Information Controller and Hub

## Controller front panel
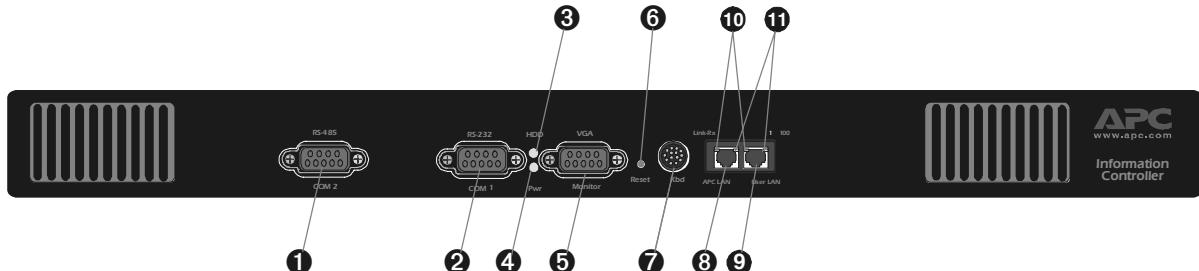


| ❶ | COM 2 | RS-485 port—reserved for future use. |
|---|-------|-------------------------------------|
| ❷ | COM 1 | RS-232 port—reserved for future use. |
| ❸ | HDD | Hard disk drive LED:<br>• amber—disk is being accessed |
| ❹ | Power | Power LED:<br>• green—the controller is powered on |
| ❺ | VGA/Monitor | Connector—reserved for future use. |
| ❻ | Reset | Switch that reboots the Information Controller. The controller is shipped with a plastic screw inserted into the reset switch. |
| ❼ | Kbd | PS/2 Keyboard port—reserved for future use. |
| ❽ | APC LAN | Ethernet port for connecting to the private APC network. |
| ❾ | User LAN | Ethernet port used to connect to the user's network. |
| ❿ | Link-Rx | Link LEDs:<br>• solid amber—link is valid<br>• flashing amber—activity on the port<br>• off—link is invalid |
| ⓫ | 100 | Speed LEDs:<br>• off—operating at 10 Mbps<br>• green—operating at 100 Mbps<br><br>⚠ Note Because the APC LAN operates at 10Mbps, it is normal for the APC LAN speed LED to be off . |

## Hub front panel

| ❶ | Pwr | Power LED:<br>• green—the hub is powered on |
|---|---|---|
| ❷ | Link-Rx | LEDs indicate status for each port:<br>• solid green—link is on<br>• flashes green—activity on the port |
| ❸ | Col | Collision LED:<br>• flashes amber—collision on network<br><br>**⚠ Note** Collisions are normal; unless this LED is on continuously, your APC LAN is operating normally. |
| ❹ | 10Base-T Ports | Station ports for connecting PowerStruXure equipment to the Information Controller. The "x" in the numbering is short for MDI-X.<br><br>**⚠ Note** Only port 32 or 32x can be in use at any time. Do not connect covers to both parts simultaneously. |
| ❺ | Uplink Port | 10Base-T port for interconnecting hubs. |

**How to shut down the Information Controller software**

You can shutdown the Information Controller through the software interface: at the **System** screen, go to the **Tools** menu and select **Shutdown Information Controller**.
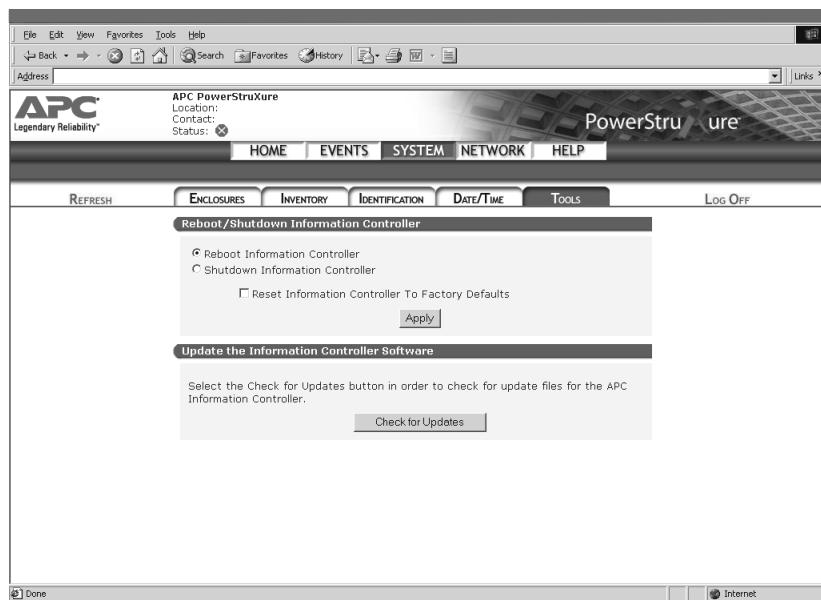
**How to access the Information Controller APC LAN**

This procedure is for accessing the Information Controller; for information on setting up the APC LAN and the Information Controller on your LAN, see the procedures in "Connect the Information Controller and Hub" on page 79.

1. Connect a computer to one of the ports on the Information Controller Hub, using a 10Base-T network cable. This computer must be configured to *automatically obtain an IP address*.

2. Release and renew your laptop's IP address:
   – for Windows 95/98 run *winipcfg.exe*
   – for Windows NT/2000, run *ipconfig.exe*

> **!**
> **Note**
> The controller will assign your computer one of its private IP addresses.

3. Access the Information Controller's local interface (via APC LAN) by opening your browser and entering the following IP address:
   `192.168.1.1`

4. Log on to the Information Controller, using the APC default username and password (*apc*, lowercase).

**How to access the Information Controller on your LAN**

This procedure is for accessing the Information Controller from your LAN; for information on setting up the APC LAN and the Information Controller on your LAN, see the procedures in "Connect the Information Controller and Hub" on page 79.

1. From a computer on your public LAN, open a browser and type in the IP address assigned to the Information Controller.

2. Enter the APC default username and password (*apc*, lowercase) on the logon screen.
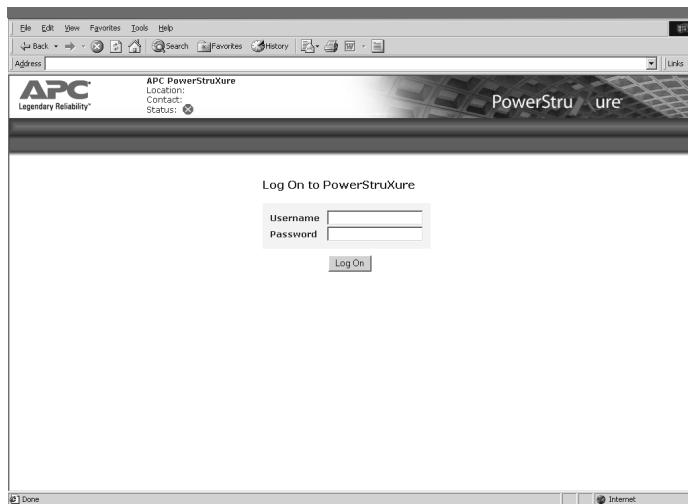
# Customization

# NetShelter VX Enclosures

**How to remove the leveling feet and casters**

1. Gently place the enclosure on its side. This should be done with all equipment removed from the enclosure.

   ⚠ **Heavy** To avoid personal injury or damage to the enclosure, two people should support the enclosure.

2. Remove the four hex nuts from each caster, using a 10-millimeter wrench, and remove the casters.
3. Fit the 14-millimeter end of the open-ended wrench (included) to the hex nut just above the round pad on the bottom of the leveling foot. Turn the wrench clockwise to extend the leveling foot until it comes off.
4. Repeat Step 3 for each of the remaining leveling feet.

**How to remove and install the side panels**

You can remove the side panels for access to the interior. To remove the side panels:

1. Use the key to unlock the panel, if necessary.
2. Slide both panel latches down at the same time and pull the top of the panel toward you.
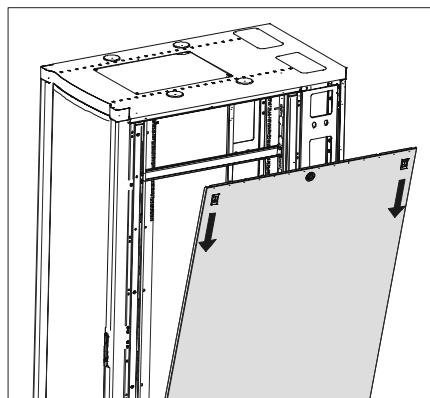


⚠ **Heavy** To avoid personal injury, two people should lift the panel.

3. Release the latches and lift the panel up and off the narrow horizontal lip at the bottom of the enclosure frame.
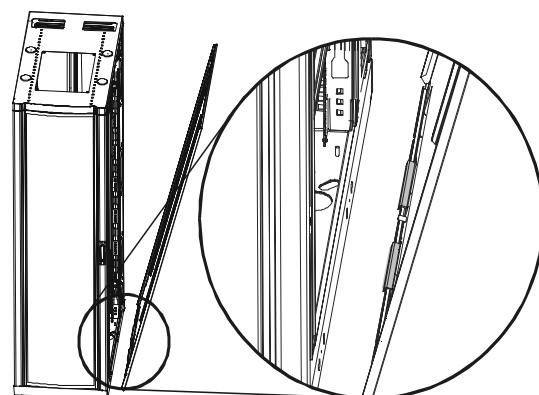


*To reinstall*: Engage the bottom of the panel securely with the rail before pushing the top of the panel forward into place.

**How to identify one U-space on the mounting rail**

When installing equipment, you will need to locate the top and bottom of a U-space on the mounting rails. Every third mounting hole on the mounting rails of a NetShelter VX enclosure is notched and numbered to indicate the middle of a U-space. A U-space takes up one of these notched holes and one hole immediately above and below it, as shown.
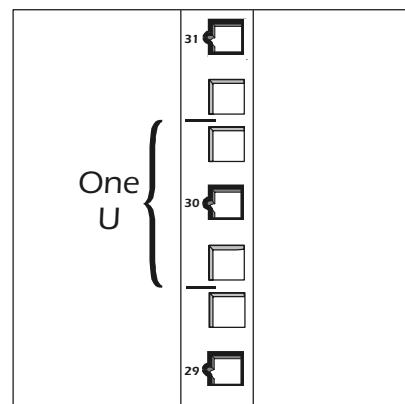


**Caged nuts**

During installation of equipment in your enclosure, you may need to install or remove caged nuts. Follow the procedures in this section when installing or removing caged nuts from the enclosure.

⚠ **Warning** Install caged nuts horizontally, with the ears engaging the sides of the mounting hole. Do NOT install caged nuts vertically with the ears engaging the top and bottom of the mounting hole.

**How to install and remove caged nuts**

❗ **Note** Install the caged nuts on the side of the mounting rail that is opposite the equipment to be mounted.

1. Insert the caged nut into the mounting hole by hooking one ear of the caged nut assembly through the far side of the hole.

2. Place the caged nut tool (included) on the other ear of the caged nut and pull to snap it into position.
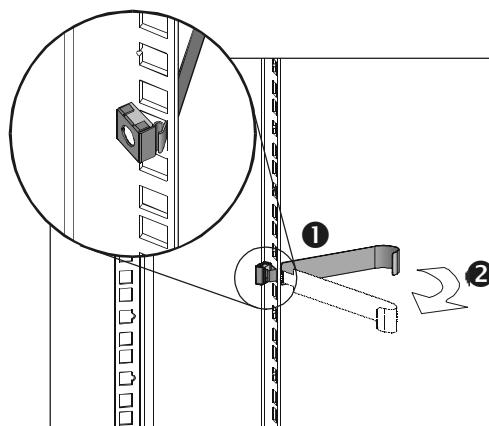


3. Detach the tool from the caged nut.

*To remove*: Remove any attached screws and reverse the action in Step 2. Grasp the caged nut before releasing the tool.

**Grounding studs**

The enclosure has thirteen grounding studs, which are located on the doors, the roof, the side panels and the frame. American Power Conversion offers an optional grounding kit (AR8390) for grounding the enclosure.
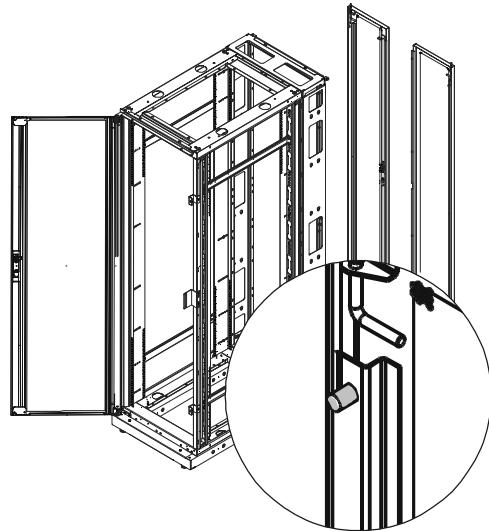
| Ground Studs | |
|---|---|
| **Qty** | **Location** |
| 4 | Base |
| 1 | Rear cabling channel |
| 1 | Roof |
| 2 | Front door |
| 4 | Rear doors |
| 1 | Side panels (base model only) |

**Location of cable access holes**

There are cable access holes in the roof ❶, sides ❷, and base ❸ of the enclosure. The rear cabling channel on the back of the enclosure has ample clearance between the doors and the mounting rails for cable routing.
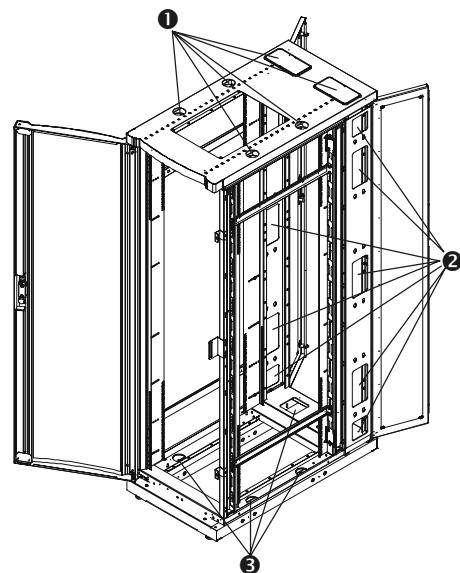
**Skirt removal**

The skirt at the front of the enclosure can be detached for additional cable access by removing the screws.
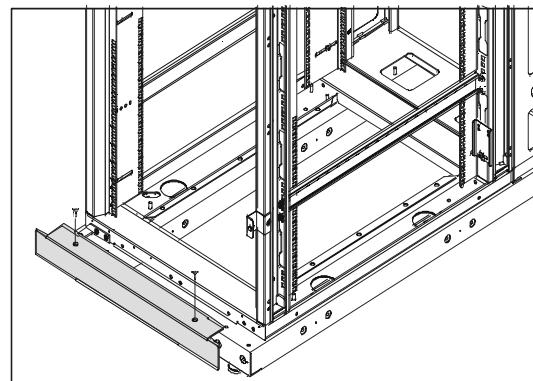


**Cable management devices**

Optional cable management devices can be used for helping to route and dress cables:

- Cable Management Hoops (AR8113)
- Cable Containment Kit (AR8116BLK)
- Rear Cable Management Tray (AR8118BLK)
- Side Cable Management Tray (AR8114BLK)

**How to reverse the door**

You can reverse or remove the front door to accommodate your site configuration. This section shows how to remove and reverse the door on your enclosure.

1. Remove both side panels. (See "How to remove and install the side panels" on page 131.)

*Reverse the door handle.*

2. Remove the two Phillips screws from the rear of the door handle assembly and remove the handle assembly from the door.
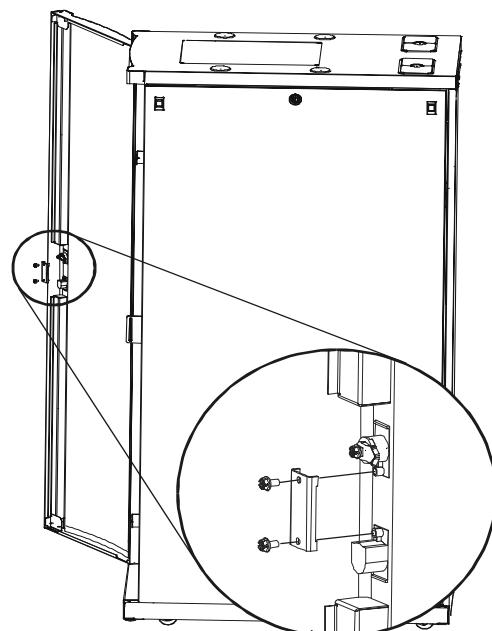


3. Rotate the door handle assembly 180° and reinstall it using the hardware removed in Step 2.
4. Continue with "Remove the door" on page 136.

**Remove the door.**

⚠ **Warning** To avoid personal injury or damage to the enclosure, one person should support the door while another releases the door from its frame.
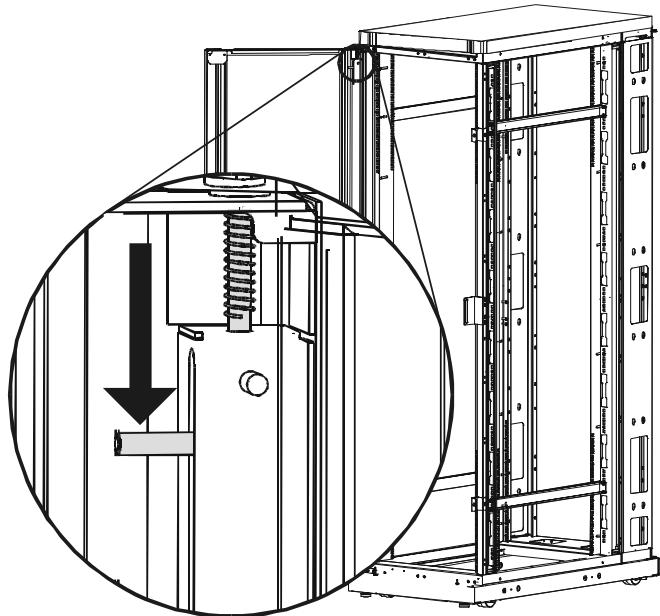
5. Open the door and pull down on the spring-loaded hinge pin attached to the top of the door. Lift the door from its frame and set safely aside.

**Remove the hinge pin brackets, bumpers, and latch plates.**

Remember the location and distance between all items being removed. You will need to duplicate this positioning when reinstalling.

6. Use a Phillips head screwdriver to remove the hinge pin brackets, bumpers, and latch plate from the enclosure frame.
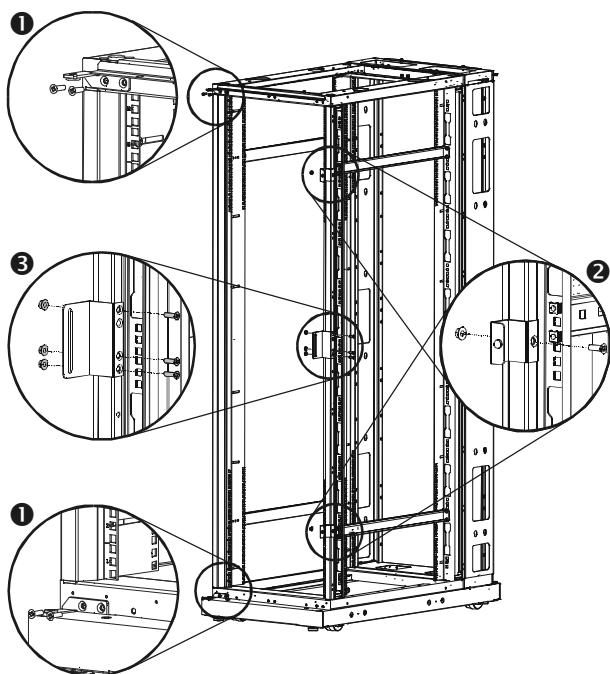


On the expansion enclosure, the bumpers and latch plate screws also attach the finishing trim. Replace the trim using the socket-head screws. Replace the bumpers and latch plate using the counter-sunk screws from the hardware bag.

### Reinstall the hinge pin brackets.

7. Reinstall the hinge pin brackets on the opposite side of the enclo-sure:

   a. Remove the small plastic plugs covering the insertion holes in the plinths and the top of the enclosure frame.

   b. Reinstall the two hinge pin brackets from their original position ❶ to their new position ❷.
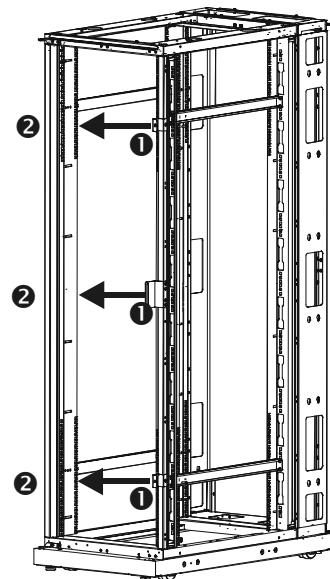


   c. Secure the hinge pin brackets by threading the hex nuts onto the screws. Hand-tighten the screws; they will be tightened firmly later in the procedure.

### Reinstall the latch plate and bumpers.

8.  Reinstall the latch plate and the two door bumpers from their original position ❶ to their new position ❷.

> **(!) Note**  Be sure to maintain the original spacing between the latch plate and bumpers, as well as their vertical relationship with the enclosure frame.
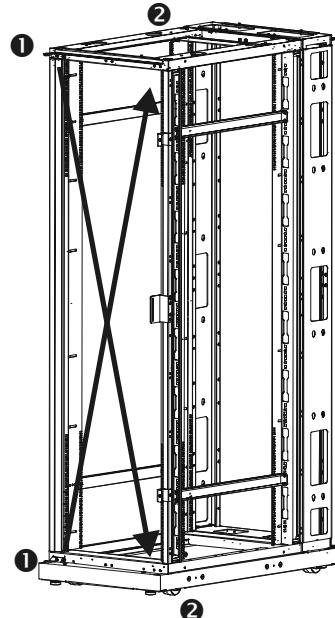


> **(!) Note**  If you are using an expansion enclosure, use the socket-head screws in the hardware bag to reinstall the latch plate and bumpers.

9.  Reinstall the small plastic plugs in the frame and the plinths in the empty holes that once held the hinge pin brackets and hinge pins before the door was reversed.

### Reinstall the door assembly.

10. Reinstall the door assembly.

> **⚠ Warning**  To avoid personal injury or damage to the enclosure, one person should support the door while another secures the door to its frame.

a.  Reverse the steps for removing the door. (See "Remove the door" on page 136.)

b.  Make sure that the door opens and closes properly and then firmly tighten the countersunk screws to secure the hinge pin brackets to the enclosure frame.

11. Reinstall the side panels for AR2100 series. (See "How to remove and install the side panels" on page 131.)

**Mounting rails**
The vertical mounting rails are factory-installed in the proper position for use with Compaq® rack-mountable equipment that has a depth of 29.13 inches (739 mm). You can adjust the rails to the front or rear a total of 2.35 inches (60 mm) to accommodate different rails or equipment with various depths. You can also move the rails by attaching them to the horizontal braces. The following sections describe the procedures for adjusting the position of the mounting rails and for moving them within the enclosure.

**Location of screws for adjusting the mounting rail**
The location of the screws that govern the position of the mounting rails is shown below.



**2.35″**
**(60 mm)**
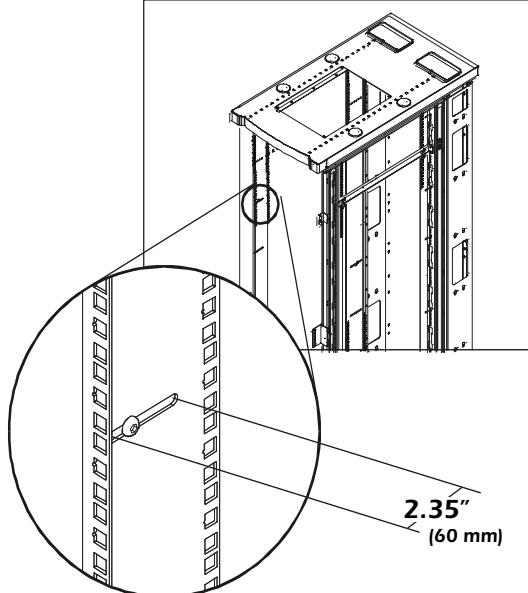
**How to adjust the mounting rails on the frame posts**
1. Use the 5-millimeter Allen wrench (included) to loosen (but not remove) the socket-head screws in the slot of the mounting rail.
2. Slide the mounting rail forward or rearward as desired, staying parallel with the frame posts. Tighten each screw.

**How to move the rails to a new position using the side braces**
1. Remove the side panels from the enclosure. (See "How to remove and install the side panels" on page 131.)
2. Use the 5-millimeter Allen wrench (included) to remove the socket-head screws in the slots of the mounting rail.
3. Locate the new position for the mounting rail.
4. Secure the vertical mounting rail to each horizontal brace:

> **(!)** **Note** You may have to adjust the position of the brace up or down to align it with the mounting channel in the rear mounting rail. (See "How to move a brace" on page 140.)

   a. Insert a caged nut into the appropriate holes at the new position on the upper and lower horizontal brace.
   b. Place the mounting rail at the new position and insert a socket-head screw through the rail, brace, and caged nut.
   c. Tighten the screw to secure the mounting rail to the brace.

**How to move a brace**

Each side of the enclosure has two horizontal braces between the vertical frame posts. These adjustable braces provide structural support and are available for managing cables or to support the mounting rails.

1. Use the 5mm Allen wrench (included) to remove the four socket-head screws that are holding the brace to the frame posts.
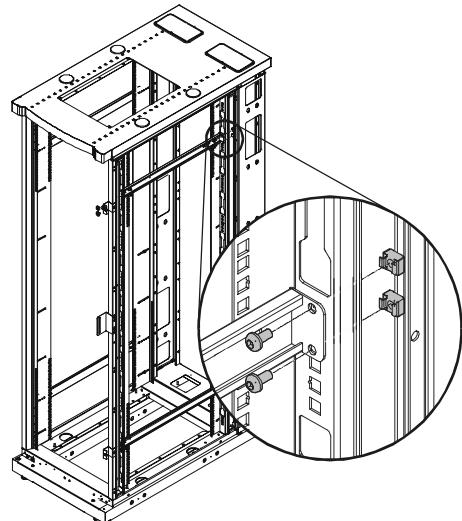


2. Remove the caged nuts from the frame post. (See "How to install and remove caged nuts" on page 133.)

3. Locate the new position for the brace and secure the brace to the frame posts:

   a. Insert a caged nut into the appropriate holes at the new position on the frame post.

   b. Place the brace at the new position and insert a socket-head screw through the brace, frame post, and caged nut.

   c. Tighten the screw to secure the brace to the frame post.

**How to remove the roof**

Remove the roof from the enclosure by removing the four socket-head screws from the inside corners. Use the 5-millimeter Allen wrench (included).
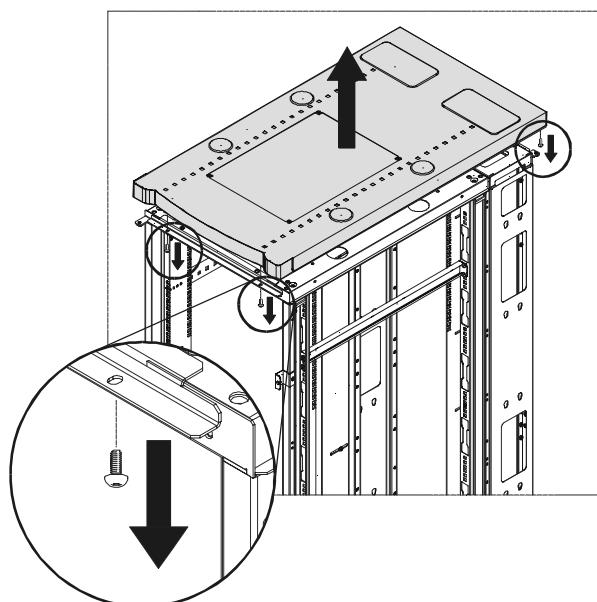
**How to move the vertical baying trim**

The vertical baying trim is pre-installed to one side of the expansion enclosure. The vertical baying trim ❶ covers the gap between enclosures after they have been joined together. Your site configuration may require you to move the trim to the other side of the enclosure.
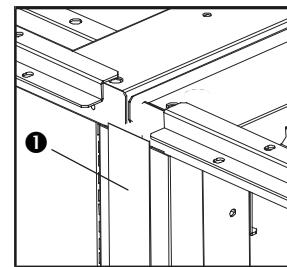


1. Using the 5-millimeter Allen wrench (included), remove the four socket-head screws securing the vertical trim, the door latch, and the door bumpers to the frame of the enclosure.
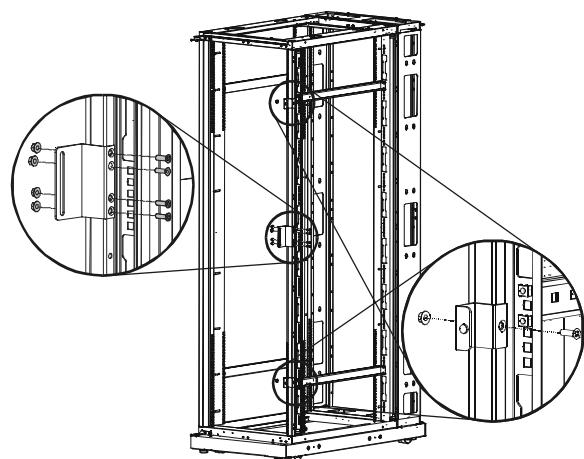


2. Replace the door latch and bumpers using the countersunk socket-head screws from the hardware bag.

3. Reinstall the trim to the opposite side of the enclosure.

   a. Insert the capped socket-head screw, removed from the other side of the enclosure, through the upper hole in the vertical trim and the original hole in the frame of the enclosure.

   b. Repeat the step above for the lower hole in the vertical trim.

   c. Tighten the screws securing the vertical trim to the enclosure assembly.

4. Reinstall any side panels required. (See "How to remove and install the side panels" on page 131.)

5. Reinstall the roof of the enclosure. Replace the four socket-head screws with the 5-millimeter Allen wrench (included).

# Metered Rack-Mount PDU

**Hardwiring procedure (optional)**

**Remove the power Cord.**

> ⚠ **Note**  Make sure that power to the Metered Rack-Mount PDU has been turned off and unplug any attached equipment to prevent damage if a mistake occurs during wiring.

1. Detach the inspection cover on the power inlet end of the Metered Rack-Mount PDU by removing the four screws on the sides of the cover and tilt the cover upward so that the terminal block is exposed. Set the screws aside for later use.

2. Loosen the four screws that hold the power cord's wires to the terminal block, and loosen the screw that holds the ground wire to the standoff on the metal chassis.

3. Pull the power cord and the inspection cover from the Metered Rack-Mount PDU.
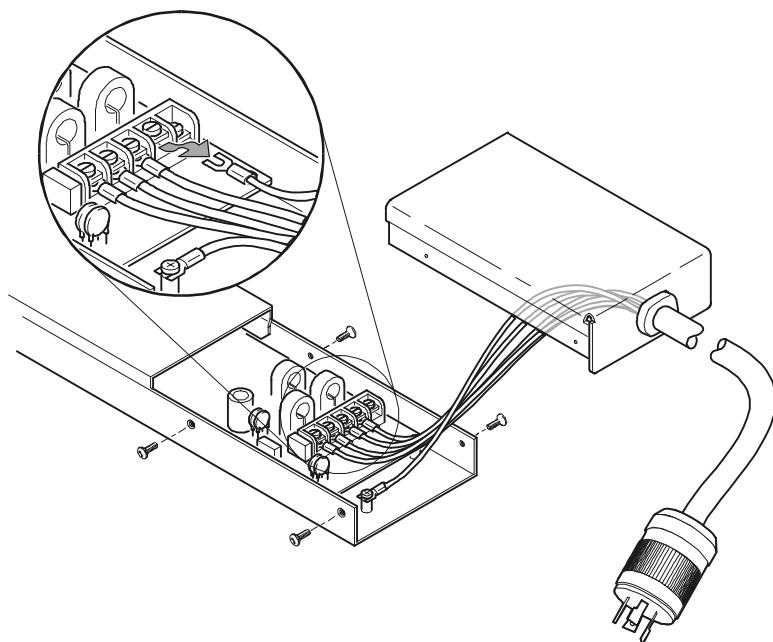
**Attach wiring to terminal block.**

4. Attach a 1-inch conduit termination to the hardwiring end cap (p/n 870-70803).

5. Attach the hardwiring end cap assembly to the power inlet end of the Metered Rack-Mount PDU, using two of the screws removed in step 1.
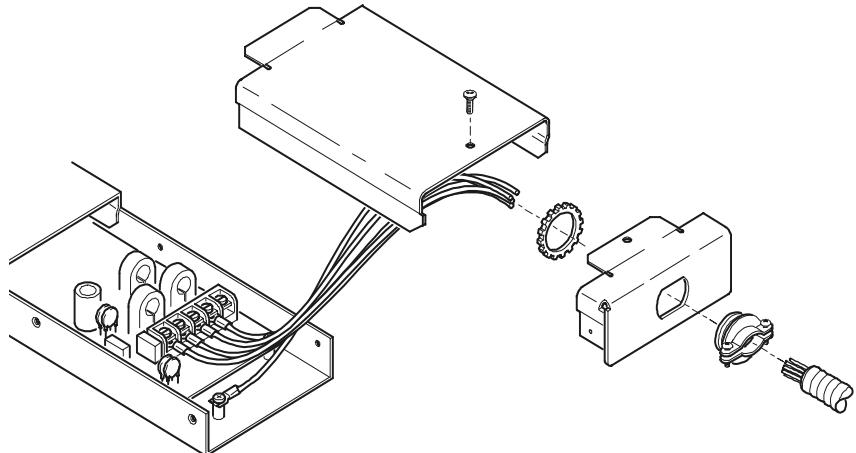


6. Attach wires to the terminal block as labeled on the board. Tighten the terminal block screws to secure the wires.
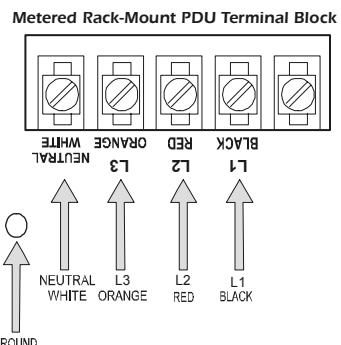


7. Attach a ground wire to the standoff on the metal chassis and tighten the screw to secure the ground to the chassis.

8. Place the hardwiring access cover (p/n 870-70804) on the strip and secure with one screw in the hole on the top of the cover.

9. Apply power to the strip, observing the status LED on the display interface. If the unit is connected properly, the LED will illuminate.

# Specifications

# PDU with System Bypass

**Operating specifications**

| Power Distribution Unit | |
|---|---|
| Operating Environment | Protected from water and conductive contaminates |
| Temperature Class | Class H (220° C) |
| Storage Elevation (for aircraft transportation) | 10 000 m |
| Relative Humidity (for operating and storage) | 95% non-condensing |
| Operating Temperature | 0 – 40° C (32 – 104° F) |
| Acoustic Noise Emission | Maximum 50dB(A) at 1 m |

**Electrical specifications**

| | 208V | 480V | 600V |
|---|---|---|---|
| Service Distribution Breaker (provided by customer) | 200 amp | 100 A | 80 amp |
| Conductors to Main Input Breaker (provided by customer) | 3/0 conductors | #3 conductors | #4 conductors |
| Transformer Type | Isolation | Step-Down | Step-Down |
| Transformer Configuration | Delta to WYE | Delta to WYE | Delta to WYE |
| Nominal Voltage Requirements | 208V: 208/120V | 480V: 208/120V | 600V: 208/120V |
| Frequency | 57 – 63 Hz | 57 – 63 Hz | 57 – 63 Hz |
| Input Voltage AC | 3-phase 3-wire plus ground, 208V | 3-phase 3-wire plus ground, 480V | 3-phase 3-wire plus ground, 600V |
| Output Voltage AC | 3-phase 4-wire plus ground, 208V | 3-phase 4-wire plus ground, 208V | 3-phase 4-wire plus ground, 208V |
| Full Load Output Rating | 40 KW | 40 KW | 40 KW |
| Maximum Continuous Input Current (at minimum mains) | 155 amps | 67 amps | 54 amps |
| Maximum Continuous Output Current + 125% Overload (Bypass Mode only) | 139 amps | 139 amps | 139 amps |
| Nominal Output Current | 111 amps | 111 amps | 111 amps |
| Nominal Input Current | 125 amps | 54 amps | 43 amps |
| Internal Static Switch Fuses | 175 amps | 175 amps | 175 amps |
| External Output Breaker | 150 amps | 150 amps | 150 amps |

# Symmetra 3-Phase UPS

| Symmetra 3-Phase UPS Specifications | |
|---|---|
| Input Specifications | |
| AC Input Voltage | The UPS will operate from mains at full load over the following ranges: 166 - 240 VAC line-to-line (for North America); 304 - 477 VAC line-to-line (for Europe) and 160 - 230 VAC line-to-line for Japan (including transformer). If the AC input voltage exceeds this range, the UPS will operate from battery power. The UPS may operate on-line below this range if the load is reduced from full power, thus extending the life of the batteries. When operating on battery power, the UPS will not retransfer to AC power until the line has returned to an acceptable level plus a hysteresis margin (based on loading on the UPS). |
| DC Input Voltage | The battery voltage produced by the battery system is +/- 192 VDC nominal |
| Input Frequency Range | 40-70 Hz. |
| Input Power Factor | >0.99 at full load and operating on-line at nominal input voltage. |
| Input Inrush Current | < normal input current without transformer* |
| Input Generator Sizing | Generator kW rating $\geq$ 1.25 x UPS kW rating<br>Generator kVA rating $\geq$ 1.40 x UPS kVA rating |
| Output Specifications | |
| Output Voltage | 3x208VAC for North America and Japan<br>3x380/400/415 VAC for Europe |
| Output Power | se electrical installation |
| Load Power Factor | 0.5 - 1.0 |
| Output Frequency | Synchronized to mains: programmable frequency range $\pm$ 3Hz or<br>$\pm$ 0.1 Hz. around nominal frequency (50 or 60 Hz). |
| Output Voltage Regulation Steady State | $\pm$ 1% |
| Output Voltage Regulation Transient/ Dynamic | $\pm$ 5% |
| Recovery Time | < 5 mS |
| Total Harmonic Distortion | <2% when loaded to 100% of rated capacity in Watts<br><5% with a computer load under all rated environmental conditions |
| Output Specifications | |
| Crest Factor | 2.7 |
| Overload Capacity | Sustainable Overload 2: <=150% for 30 seconds |

| Symmetra 3-Phase UPS Specifications | |
|---|---|
| Efficiency, Fully Charged | >91.5% for North America |
| Physical Specifications | |
| Audible Noise - at 70% Load | <58 dBA |
| Dimensions | Width: 23.5" Depth: 34.3" Height: 81.4" (597 x 871 x 2058 mm) for Europe and North America<br>Width: 47" Depth: 34.3" Height: 2068" (1194x871x2058) for Japan |
| Weight - Fully Loaded | 1395 lbs (633 kg) for Europe and North America<br>2055 lbs (932 kg) for Japan (Isolation Transformer included) |
| Heat Dissipation - Fully Loaded | 12,682 BTU/hr (North America) |
| Compliance Specifications | |
| UL Listed | UL 1778 |
| CE Verified Class A | Standards EN50091-2 (Uninterruptible Power Systems, Part 2: EMC Requirements), EN 55022 (Limits and methosd of measurement of radio disturbance characteristics of information technology equipment) and EN 50082-1 (Electromagnetic Compatibility - General Immunity Standard Part 1: Residential, Commercial and Light Industry). |

$*\leq$ 10 x normal input current with isolation transformer (optional equipment).

# 3-Phase Automatic Transfer Switch

| Item | Specification |
|---|---|
| Nominal input voltage | 100/173–120/208 V |
| Acceptable input voltage | 90/156–140/242 V |
| Nominal input frequency | 50/60 Hz |
| Input connectors | Two 36-inch, attached L21-20P line cords |
| Output connectors | One 36-inch, attached L21-20R line cord |
| Maximum total current draw | 16 A per phase |
| Size (h × w × d) | 1.71 × 17.00 × 12.00 in (4.34 × 43.18 × 30.48 cm) |
| Weight: | 15.00 lb (6.8 kg) |
| Shipping Weight | 20.5 lb (9.30 kg) |
| Elevation (above MSL): Operating | 0 to 10,000 ft (0 to 3000 m) |
| Elevation: Storage | 0 to 50,000 ft (0 to 15,000 m) |
| Temperature: Operating | 32–104° F (0–40° C) |
| Temperature: Storage: | 32–113° F (0–45° C) |
| Operating Humidity | 0–95%, non-condensing |
| EMC Verification | FCC Class A, DoC Class A, VCCI |
| Safety Verification | UL, cUL (UL 60950) |

# Metered Rack-Mount PDU

## AP7601/AP7602

| Electrical Specifications | |
|---|---|
| Input | 100–120/173–208 V, 3φ 16 A<br>7601: NEMA L21-20 plug<br>7602: NEMA L21-20 plug |
| Output | 7601: 100–120 V, 3 × 16 A<br>    42, NEMA 5-20 R receptacles<br>7602: 100–120/173–208 V, 3 × 16A<br>    21, NEMA 5-20R; 6, NEMA L6-20R receptacles |
| **Physical Specifications** | |
| Dimensions | 1.75 × 3.5 × 60 in (4.5 × 8.9 × 152.4 cm) |
| Weight | 17 lb (7.7 kg) |
| Shipping dimensions | 4 × 5 × 72 in (10.2 × 12.7 × 182.9 cm) |
| Shipping weight | 19 lb (8.6 kg) |
| Operating temperature | 23–113° F (-5– 45° C) |
| Operating humidity | 5–95% RH non-condensing |
| Operating elevation | 10,000 ft (3000 m) above MSL |
| Storage temperature | -13–149° F (-25–65° C) |
| Storage humidity | 5–95% RH non-condensing |
| **Compliance Specifications** | |
| Approvals | UL, CUL, FCC, VCCI |

# Information Controller and Hub

**Information Controller specifications**

| Electrical Specifications | |
|---|---|
| Input | 100–240 VAC; 50/60 Hz; 0.5 A |
| Physical Specifications | |
| Dimensions | 1.7 ×17 ×6.5 in (4.3 × 43.2 × 16.5 cm) |
| Weight | 6.2 lb (2.8 kg) |
| Shipping dimensions | 2.75 ×18.75 ×13.5 in (7.0 × 47.7 × 34.3 cm) |
| Shipping weight | 8.0 lb (3.65 kg) |
| Operating temperature | 23–113°F (-5–45°C) |
| Operating humidity | 5–95% RH non-condensing |
| Operating elevation | 10,000 ft (3000 m) above MSL |
| Storage temperature | -13–49°F (-25–65°C) |
| Storage humidity | 5–95% RH non-condensing |
| Compliance Specifications | |
| Approvals | UL, cUL, VDE, FCC Class A, AS/NZS 3548, VCCI Class A, EN 55024, EN61000-3-2, EN61000-3-3, CE |

**Information Controller Hub specifications**

| Electrical Specifications | |
|---|---|
| Input | 100–240 VAC; 50/60 Hz; 0.5 A |
| Physical Specifications | |
| Dimensions | 1.7 ×17.0 ×7.0 in (4.3 × 43.2 × 17.8 cm) |
| Weight | 4.8 lb (2.2 kg) |
| Shipping dimensions | 3.25 ×19.25 ×10.5 in (8.3 × 48.9 × 26.7 cm) |
| Shipping weight | 6.5 lb (3.0 kg) |
| Operating temperature | 23–113°F (-5– 45°C) |
| Operating humidity | 5–95% RH non-condensing |
| Operating elevation | 10,000 ft (3000 m) above MSL |
| Storage temperature | -13–149°F (-25–65°C) |
| Storage humidity | 5–95% RH non-condensing |
| Compliance Specifications | |
| Approvals | UL, cUL, VDE, FCC Class A, VCCI Class A, EN55022, EN 50082-1, AS/NZS 3548 |

# Maintenance

# Symmetra 3-Phase UPS

**Handling and transport**

Follow these guidelines if you need to ship the Symmetra 3-Phase UPS to another location.

⚠ **Electrical Hazard** — **Always REMOVE BATTERIES before shipping the Symmetra 3-Phase UPS to avoid damage during transport. (U.S. Federal Regulation requires that batteries be disconnected during shipment.)**

The above requirement applies anytime the Symmetra 3-Phase UPS is moved—either indoors or outdoors, by itself or as part of a PowerStruXure installation.

Remember to reinstall the battery and power modules after the Symmetra 3-Phase UPS has arrived at its destination.

**Module replacement**

Battery units, power modules, and intelligence modules can be replaced by the user. If a power or a main intelligence module fails and a "redundant" module is present, the failed module can be replaced without interrupting power to the load equipment.

(!) **Note** — If a functioning intelligence module is already installed, you can replace a redundant intelligence module without interrupting the power to the load.

If the Symmetra 3-Phase UPS is not in the on-battery operating mode, you can replace a battery module without interrupting power to the load.

**How to obtain replacement modules**

To obtain a replacement module, contact APC Customer Support (see page 168). Prepare to provide the additional information:

- In the event of a module failure, the display interface may display additional "fault list" screens. Press any key to scroll through these fault lists, record the information, and relay it to the APC Customer Support technician.
- If possible, call APC Customer Support from a telephone that is within reach of the Symmetra 3-Phase UPS display interface. This will help to gather and report additional information to the APC Customer Support technician.
- Be prepared to provide a detailed description of the problem. A Customer Support technician will help you solve the problem over the telephone, if possible, or will give you a return material authorization (RMA) number. If a module is returned to APC, this RMA number must be clearly printed on the outside of the package.
- If the Symmetra 3-Phase UPS is within the warranty period, repairs will be performed free of charge. (See "Warranty" on page 165.) If it is not within the warranty period, there will be a charge for repair.
- If the Symmetra 3-Phase UPS is covered by an APC PowerPlan$^{SM}$ service product, have that information available and give it to the APC Customer Support technician.

### How to replace a power module



Only qualified, APC trained personnel should replace power modules.

**Warning**

The display interface indicates the location of the faulty power module (rows 1 through 5).

**To remove the faulty power module:**

1. To deactivate the power module, turn the knob (with arrow pointing toward the module) counterclockwise until it points downward.
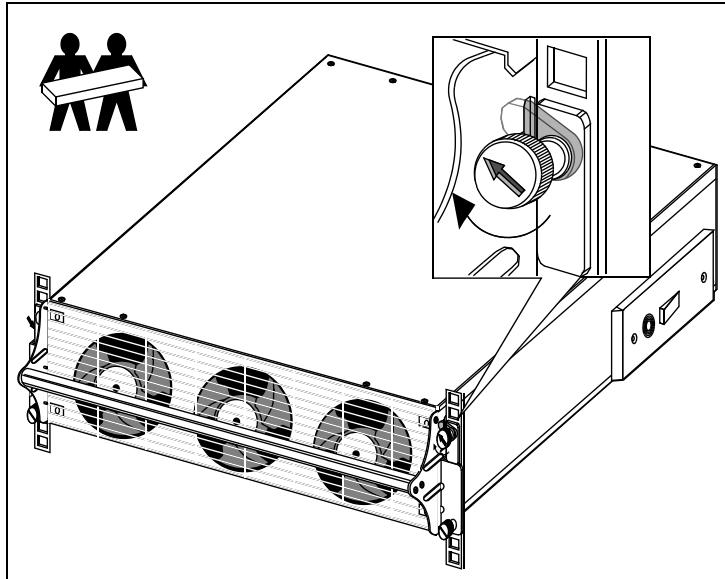


2. Turn the spring-activated finger screws (one at either side of the module) until they pop out.

3. Standing on either side of the Symmetra 3-Phase UPS enclosure, two people should pull the power module outward until it is fully extended in the locked position.

4. With the power module resting in the UPS enclosure, release the lock by depressing the catch on each side of the power module.

5. Pull the power module away from the UPS enclosure.

**To install the new power module:**

1. With one person on each side of the power module, push the power module all the way into the Symmetra 3-Phase UPS enclosure. (The power module is self-guiding.)
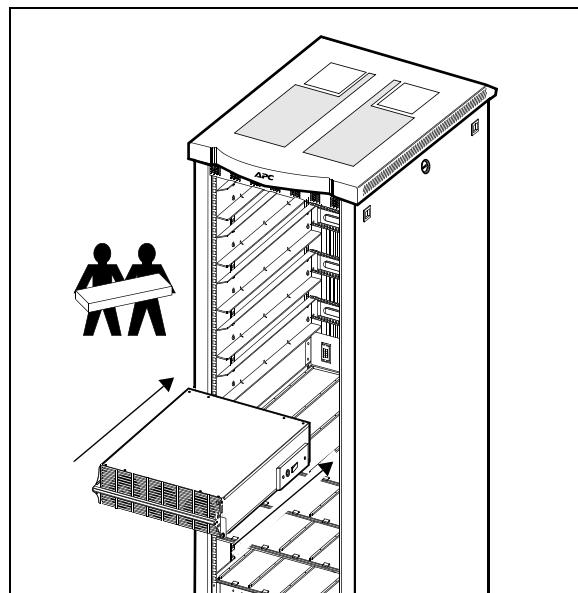


2. Turn the finger screws clockwise to fasten.

3. Turn the knob clockwise until the arrow points toward the power module to re-activate the power module.

4. Verify that the Symmetra 3-Phase UPS display interface shows a message saying that it has registered the installation.

**Note** If your Symmetra 3-Phase UPS includes a "redundant" power module, the failed module can be replaced without interrupting power to the connected equipment.

**How to replace a battery unit**

 **Warning**
Only qualified, APC-trained personnel should replace battery units.

The Symmetra 3-Phase UPS display interface will indicate the location of the faulty battery unit (rows 1 through 4).

**To remove the faulty battery unit**:

1. Holding the handle, gently lift the battery handle and then pull it outward until it is fully extended in the locked position.
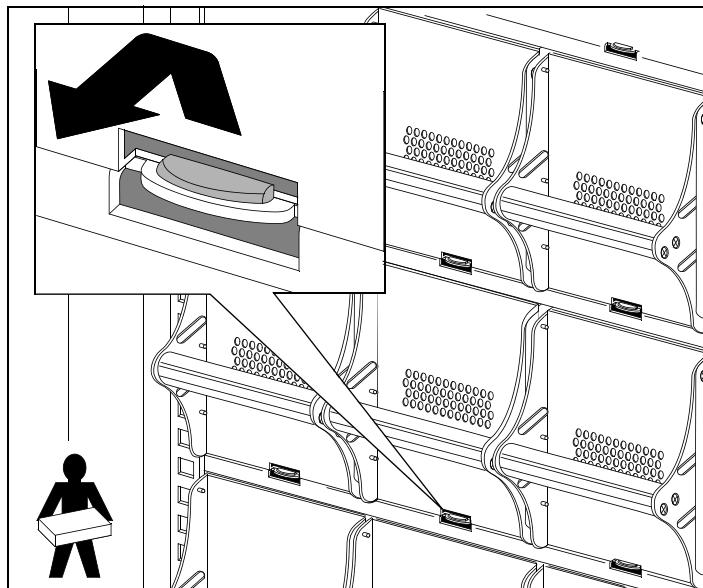


2. To release it from the lock mechanism, gently push the battery upward again and pull outward, supporting the battery unit with your free hand.

**To install a new battery unit**:

1. Position the battery to slide in between the two grooves in the empty slot in the enclosure and push the unit all the way into the Symmetra 3-Phase UPS enclosure.

2. Check that the Symmetra 3-Phase UPS display interface shows a message saying that it has registered the installation.

 **Warning**
Install battery units into the enclosure only when you are ready to apply power to the Symmetra 3-Phase UPS. Failure to do so can result in a deep discharge of the batteries, which may cause permanent damage.

Store the battery module(s) in a cool ambient temperature below 77° F (25° C).

 **Note**
Verify that the Symmetra 3-Phase UPS is operating in on-line mode before replacing a battery module. If the unit is operating in the on-battery mode, power to the connected equipment may be interrupted while the battery is being replaced.

**How to replace an
intelligence module**

 **Note** A redundant intelligence module can be replaced without interrupting power to the connected equipment, provided that another functioning intelligence module is already installed.

**To remove the faulty intelligence module**:

1. Loosen the two Phillips screws at either side at the top of intelligence module. Push the small tab in the left side of the module downward to deactivate the intelligence module.
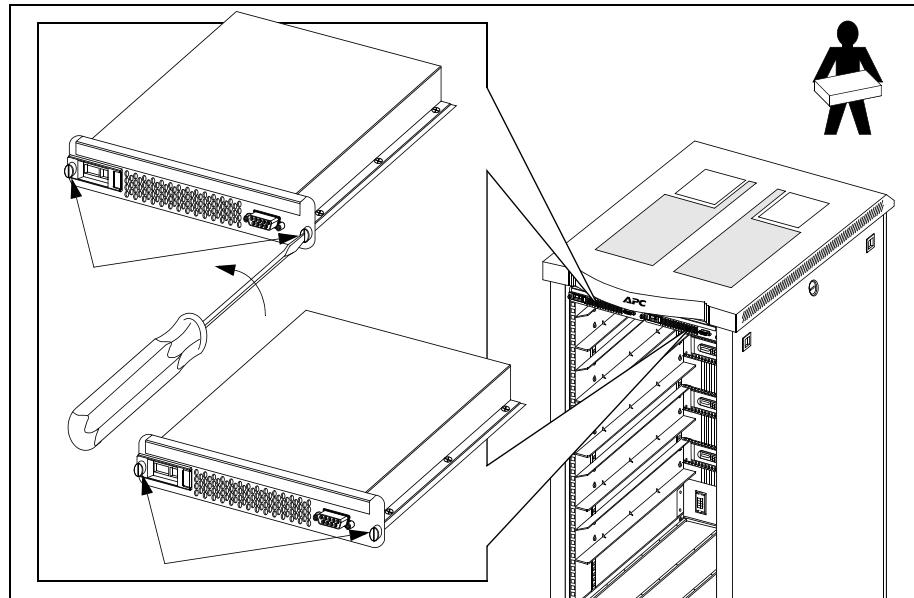


2. Carefully remove the intelligence module from the enclosure by pulling outward on the handle.

**To install the new intelligence module**:

1. Carefully position the intelligence module between the grooves in the empty slot at the top of the Symmetra 3-Phase UPS enclosure and slide the module inward.

2. Tighten the two Phillips screws to secure the intelligence module to the enclosure.

3. Push the small tab upward to re-activate the intelligence module.

4. Verify that the Symmetra 3-Phase UPS display interface shows a message reporting that it has registered the installation.

**How to replace cards**

1. Loosen the two Phillips screws at both sides of card.

2. Carefully pull the card outward.

3. Verify that the UPS display interface shows a message reporting that it has registered the installation.
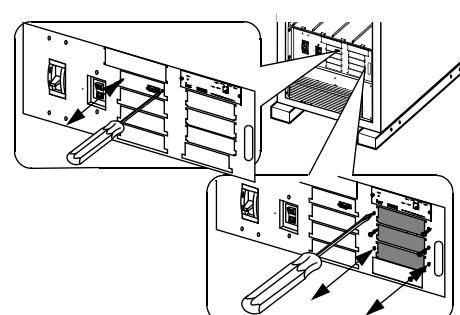


Reverse the above procedures to install a new card.

**Replacement parts**

| Replacement Parts and Numbers | |
|---|---|
| 10kW Power Module | SYPM10KF |
| 40kW Symmetra 3-Phase UPS Only | SYCF40KF |
| Battery Module | SYBT4 |
| Battery Monitoring Card | SYCBTMON |
| Battery Unit | SYBTU1 |
| Display and Computer Interface Card | SYCDCI |
| Intelligence Module | SYMIM4 |
| Network Management Card | AP9616 |
| Switch Gear Monitoring Card | SYCSGMON |
| Symmetra 3-Phase UPS Static Switch Module | SYSSW40KF |
| System ID Card | SYCSYSID |
| System Power Supply Card | SYCSPS |
| XR Communication Card | SYCXRCOM |
| XR Frame only | SYCFXR8 |

**How to return modules to APC**

Call APC Customer Support (see "APC Worldwide Customer Support" on page 168) to obtain an RMA number. To return a failed module to APC, pack the module in the original shipping materials, and return it by insured, prepaid carrier. The APC Customer Support technician will provide the address. If you no longer have the original shipping materials, ask the technician about obtaining a new set. It is very important that you pack the module properly to avoid damage in transit. Never use stryrofoam beads or other loose packaging materials when shipping a module. The module may settle in transit and become damaged. Enclose a letter in the package with your name, RMA number, address, a copy of the sales receipt, description of the problem, a phone number, and a check (if necessary).

**Note**  Damages sustained in transit are not covered under warranty.

# Metered Rack-Mount PDU

*How to download firmware revisions to the Metered Rack-Mount PDU*

**⚠**
**Note**

During firmware downloads, power will not be interrupted to the Metered Rack-Mount PDU outlets.

1. Go to the APC Web site and download the latest firmware version for the Metered Rack-Mount PDU.

2. Access the Metered Rack-Mount PDU internal menus: follow the instructions in "How to configure through a serial port connection" on page 89.

3. Log on to the Metered Rack-Mount PDU as an Administrator.

4. From the Main menu, type 6 and press ENTER to choose the **System Management** item.

5. From the System Management menu, type 3 and press ENTER to choose the **Firmware Download** item. From the Firmware Download menu:

   a. Type 1 and press ENTER to initiate a download. The internal menu will dispay C repeatedly and the digital display dL.

   b. Select the **Transfer** pull-down menu from the menu bar.

   c. Select **Send File** from the Transfer pull-down menu.

   d. In the Send File window, browse for and select the firmware file you copied to your hard drive.

   e. In the Send File window, set the protocol to **Xmodem** and press the **Send** button.

When the firmware download is complete, the digital dispaly will refresh and display the current reading again.

# Product Information

# Warranty

**Limited Warranty**

American Power Conversion (APC) warrants its products to be free from defects in materials and workmanship for a period of two years from the date of purchase, except in India where the period is one year for battery modules. Its obligation under this warranty is limited to repairing or replacing, at its own sole option, any such defective products. To obtain service under warranty you must obtain a returned material authorization (RMA) number from APC Customer Support (See "How to Obtain Service" on page 167.) Products must be returned with transportation charges prepaid and must be accompanied by a brief description of the problem encountered and proof of date and place of purchase. This warranty does not apply to equipment which has been damaged by accident, negligence, or misapplication or has been altered or modified in any way. This warranty applies only to the original purchaser who must have properly registered the product within 10 days of purchase.

EXCEPT AS PROVIDED HEREIN, AMERICAN POWER CONVERSION MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Some states do not permit limitation or exclusion of implied warranties; therefore, the aforesaid limitation(s) or exclusion(s) may not apply to the purchaser.

EXCEPT AS PROVIDED ABOVE, IN NO EVENT WILL APC BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OF THIS PRODUCT, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Specifically, APC is not liable for any costs, such as lost profits or revenue, loss of equipment, loss of use of equipment, loss of software, loss of data, costs of substitutes, claims by third parties, or otherwise. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

# Life-Support Policy

**General policy**

American Power Conversion (APC) does not recommend the use of any of its products in the following situations:

- In life-support applications where failure or malfunction of the APC product can be reasonably expected to cause failure of the life-support device or to affect significantly its safety or effectiveness.
- In direct patient care.

APC will not knowingly sell its products for use in such applications unless it receives in writing assurances satisfactory to APC that (a) the risks of injury or damage have been minimized, (b) the customer assumes all such risks, and (c) the liability of American Power Conversion is adequately protected under the circumstances.

**Examples of life-support devices**

The term *life-support device* includes but is not limited to neonatal oxygen analyzers, nerve stimulators (whether used for anesthesia, pain relief, or other purposes), autotransfusion devices, blood pumps, defibrillators, arrhythmia detectors and alarms, pacemakers, hemodialysis systems, peritoneal dialysis systems, neonatal ventilator incubators, ventilators (for adults and infants), anesthesia ventilators, infusion pumps, and any other devices designated as "critical" by the U.S. FDA.

Hospital-grade wiring devices and leakage current protection may be ordered as options on many APC UPS systems. APC does not claim that units with this modifications are certified or listed as hospital-grade by APC or any other organization. Therefore these units do not meet the requirements for use in direct patient care.

# How to Obtain Service

**If problems persist**

If the equipment requires service do not return it to the dealer! Follow the steps below:

1. Review the appropriate sections of this manual to troubleshoot common problems.

2. Verify that no circuit breakers have been tripped. A tripped circuit breaker is the most common UPS problem!

3. If the problem persists, contact APC Customer Support by referring to "How to Contact APC" on page 168.

4. Note the model number of the product, the serial number, and the date purchased. A technician will ask you to describe the problem and try to solve it over the phone, if possible. If this is not possible the technician will issue a returned material authorization (RMA) number.

> **(!)** **Note**  If the equipment is under warranty, repairs are free. If not, there is a repair charge. Warranty information appears on page 165.

5. Pack the equipment in its original packaging. If the original packing is not available, ask Customer Service about obtaining a new set.

6. For information on how to pack a Symmetra 3-Phase UPS, refer to "Handling and transport" on page 155.

7. Pack the product properly to avoid damage in transit. Never use polystyrene beads for packaging. Damage sustained in transit is not covered under warranty.

8. Mark the RMA number on the outside of the package.

9. Return the equipment by insured, prepaid carrier to the address given to you by Customer Service.

# How to Contact APC

***APC Worldwide Customer Support***

Customer support for this or any other APC product is available at no charge in any of the following ways:

- Visit the APC Web site to find answers to frequently asked questions (FAQs), to access documents in the APC Knowledge Base, and to submit customer support requests.

  – **www.apc.com** (Corporate Headquarters)
  – Connect to localized APC Web sites for specific countries, each of which provides customer support information.
  – **www.apc.com/support**/
  – Global support with FAQs, knowledge base, and e-support.
  – Contact an APC Customer Support center by telephone or e-mail.
  – Regional centers:

  | APC Corporate Headquarters (U.S. and Canada) | (800) 800-4272 (toll-free) |
  |---|---|
  | Latin America | (1) (401) 789-5735 (United States) |
  | Europe, Middle East, Africa | (353) (91) 702020 (Ireland) |
  | Japan | (03) 5434-2021 Guidance 3 |

  – Local, country-specific centers: go to **www.apc.com/support/ contact** for contact information.
- Contact the APC representative or other distributor from whom you purchased your APC product for information on how to obtain local customer support.

# Document Information

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